Estimating Sea-level Allowances for the Coasts of Canada and the Adjacent United States Using the Fifth Assessment Report of the IPCC

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Estimating Sea-level Allowances for the coast of Canada and adjacent United States using the Fifth Assessment Report of the IPCC

by

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ABSTRACT

Zhai L., B. Greenan, J. Hunter, T.S. James, G. Han, R. Thomson, and P. MacAulay 2014. Estimating Sea-level Allowances for the coasts of Canada and the adjacent United States using the Fifth Assessment Report of the IPCC. Can. Tech. Rep. Hydrogr. Ocean. Sci. 300: v + 146 pp.

Sea-level allowances at 56 tide gauge sites along the coasts of Canada and the adjacent United States for the 21st century are estimated based on the method of Hunter (2012a). The allowances are defined as the amount by which an asset needs to be raised in order to maintain the same frequency of inundation events as that site has experienced in the recent past. The allowances are determined based on the latest projections of regional sea-level rise from the Fifth Assessment Report (AR5) of the Intergovernmental Panel on Climate Change (IPCC), and on the statistics of historical tides and storm surges (storm tides). The latter have been derived from tide-gauge data and are assumed to remain unchanged during the 21st century.

The allowances show significant spatial variation. The highest allowances occur along the coast of Nova Scotia and Prince Edward Island, where they result from the combined effects of local steric and dynamic sea level rise and land subsidence associated with glacial isostatic adjustment (GIA). The negative allowance at Churchill of Hudson Bay is caused by the land uplift due to GIA. Along the Pacific coast, the allowances are positive, arising from the combined effects of GIA and steric and dynamic sea level rise, but they could be complicated by the tectonic processes which are not included in the GIA model predictions.

The allowances increase with time during the 21st century because of increasing mean sea-level rise and its increasing uncertainty. For the period 1995-2050 and for Representative Concentration Pathway RCP8.5, the allowances are 0.08 to 0.22 m for the Pacific coast, 0.13 to 0.45 m for the east coast of Canada, -0.31 m for Churchill and 0.30 m for Tuktoyaktuk along the Beaufort coast.

For the period 1995-2099 and the RCP8.5, the allowances are 0.36 to 0.67 m for the Pacific coast, 0.52 to 1.32 m for the east coast of Canada, -0.05 m for Churchill and 0.78 m for Tuktoyaktuk.

RÉSUMÉ

Zhai L., B. Greenan, J. Hunter, T.S. James, G. Han, R. Thomson and P. MacAulay, 2014. Estimation des tolérances du niveau de la mer pour les côtes canadiennes et adjacentes des États-Unis à l'aide du cinquième rapport d'évaluation du Groupe d'experts intergouvernementaux sur l'évolution du climat. Rapp. tech. can. hydrogr. sci. océan. 300: v + 146 pp.

Les tolérances relatives à l'élévation du niveau de la mer à 56 sites dotés de marégraphes le long des côtes canadiennes et adjacentes des États-Unis pour le XXIe siècle sont estimées d'après la méthode de Hunter (2012). Les tolérances sont définies comme étant le niveau auquel un actif doit se trouver pour maintenir la même fréquence d'inondations que celles que l'emplacement a connues récemment. Les tolérances sont déterminées selon les plus récentes

prévisions de l'élévation régionale du niveau de la mer issues du cinquième rapport d'évaluation (RE5) du Groupe d'experts intergouvernementaux sur l'évolution du climat, et les statistiques relatives aux marées historiques et aux ondes de tempête (marées de tempête). Ces dernières ont été établies à partir des données provenant des marégraphes et on suppose qu'elles demeureront les mêmes tout au long du XXIe siècle.

Les tolérances montrent une importante variation spatiale. Les plus élevées se produisent le long de la côte de la Nouvelle-Écosse et de l'Île-du-Prince-Édouard, où elles découlent des effets combinés de l'élévation stérique et dynamique du niveau de la mer à l'échelle locale et de l'affaissement du sol associé à un ajustement isostatique glaciaire. La tolérance négative à Churchill dans la baie d'Hudson est causée par le soulèvement des terres attribuable à un ajustement isostatique glaciaire. Le long de la côte du Pacifique, les tolérances sont positives et augmentent du nord au sud, découlant des effets combinés de l'ajustement isostatique glaciaire et de l'élévation stérique et dynamique du niveau de la mer, mais elles pourraient être compliquées par les processus tectoniques qui ne figurent pas dans les prévisions du modèle d'ajustement isostatique glaciaire.

Les tolérances augmentent avec le temps au cours du XXIe siècle en raison de l'augmentation du niveau moyen de la mer et de l'incertitude croissante. Pour la période de 1995-2050 et le profil représentatif de l'évolution de concentration RCP8,5, les tolérances sont de 0,08 à 0,22 m pour la côte du Pacifique, de 0,13 à 0,45 m pour la côte est du Canada, -0,31 m pour Churchill et 0,30 m pour Tuktoyaktuk, le long de la côte de Beaufort.

Pour la période de 1995-2099 et le profil représentatif de l'évolution de concentration RCP8,5, les tolérances sont de 0,36 à 0,67 m pour la côte du Pacifique, de 0,52 à 1,32 m pour la côte est du Canada, -0,05 m pour Churchill et 0,78 m pour Tuktoyaktuk.

1. Introduction

Global mean sea level (GMSL) has risen at a mean rate of 1.7 (1.5 to 1.9) mm yr^{-1} between 1901 and 2010 (Church et al., 2013a). The rate of sea level rise increased over the 20th century. Ocean thermal expansion and glacier melting are the dominant contributors to the 20th century GMSL rise. However, regional ocean volume change (steric and dynamical effect) and vertical land motion can cause the rate of regional (relative) sea level (RSL) change considerably different from that of the GMSL. The mean sea level (MSL) is defined as sea level at a given location averaged over a period of one year. GMSL is determined as the spatial average of MSL. Relative sea level (RSL) is defined as sea level measured with respect to land, and is often measured using tide gauges. The use of 'sea level' elsewhere in this report refers to RSL. In East Canada, the rates of observed RSL change show large regional variations, from 2 to 4 mm yr^{-1} (above the rate of GMSL rise) in the southeast to -2 mm yr^{-1} in the northwest (Han et al., 2014). This spatial difference can be attributed to that in the vertical land motion associated with the glacial isostatic adjustment (GIA) to the last glacier maximum.

According to the Fifth Assessment Report (AR5) of the Intergovernmental Panel on Climate Change (IPCC, IPCC 2013), the future rate of GMSL rise will very likely (90-100% probability) exceed the observed rise under all Representative Concentration Pathways (RCPs) scenarios. For the period 2081-2100, compared to 1986-2005, GMSL rise is likely (66-100%) to be in the 5 to 95% range of projections, which give 0.32 to 0.63 m for RCP4.5, and 0.45 to 0.82 m for RCP8.5 (Church et al., 2013a). The RSL change projections are very likely to have a strong regional pattern in the 21st century and beyond.

The occurrence of future sea level extreme events will increase significantly, and it is primarily caused by the mean sea level rise (Church et al., 2013a). Societal implications of increased flooding events have been shown in many studies. A recent study done on a global scale (Hinkel et al., 2014) shows that coastal regions are expected to face massive damage cost of trillions of dollars caused by storm surge flooding under the 21st century sea level rise, if no adaptation action is taken. The need for a precautionary approach to minimize negative impacts of sea level rise was recognized by a Halifax harbor planning strategy (Forbes et al., 2009). Inundation potentials, e.g. in Halifax of Nova Scotia and Charlottetown of Prince Edward Island are high under rising sea level (Forbes et al., 2009; Bernier et al., 2007). Small Craft Harbours (SCH) and Real Property, Safety and Security (RPSS) sectors of Fisheries and Oceans Canada (DFO) maintain a significant inventory of coastal assets that are vulnerable to the impacts of sea-level rise. Therefore there is a need to provide objective scientific advice to RPSS, SCH and municipalities on future sea level extremes.

In 2012, DFO funded a project entitled Pilot Tools for Estimating Waves and Sea-Level Extremes under Conditions of Uncertain Climate Change under the Aquatic Climate Change Adaptation Services Program (ACCASP). Hunter's (2012a) sea level allowance methodology was adopted and implemented at 9 tide gauge sites in Atlantic Canada (Zhai et al., 2013). Sea level allowances are changes in the elevation of infrastructure required to maintain the current level of flooding risk in a future scenario of sea level rise (Hunter et al., 2013). The key feature of this approach is that it takes into account changes in future mean sea-level rise, and the uncertainties in projections of these changes. In 2013, the Canadian Extreme Water Level Adaptation Tool (CAN-EWLAT) project was funded under ACCASP to extend and update this computation of sea level allowances to other tide gauge sites in regions of Atlantic Canada, the Arctic and the Pacific coast based on regional sea level projections from IPCC's AR5. CAN-

EWLAT project has benefited greatly from the outputs of the ACCASP Trends & Projections effort being carried out for the Atlantic Basin (Loder and van der Baaren, 2013; Loder et al., 2013).

This report focuses on estimating sea-level allowances at 56 tide gauge sites along the coasts of Canada and the adjacent United States. Sea-level allowances are computed for each site based on projections of regional sea level change from the IPCC's AR5 for the medium-low RCP4.5 and highest RCP8.5 scenarios. In AR5, four scenarios were chosen in order to give a range of alternative images of how the future may unfold. In this report, we present results primarily for RCP8.5 because recent emissions track closely to RCP8.5, and include results for RCP4.5 for completeness. It is important to note that the allowance only deals with the effect of sea level rise on inundation, but not on coastline recession through erosion (Ranasinghe et al., 2012).

This report is structured as follows. Section 2 summarizes the method of deriving the sea-level allowances. Section 3 describes the tide-gauge data and the statistics of extreme water levels. Section 4 presents the projections of regional sea-level rise. Sea-level rise allowances are presented in Section 5, followed by conclusions in Section 6 and future steps in Section 7. Appendix A presents statistics of storm tides for tide gauges, and Appendix B summarized sea level projections and sea level allowances for each tide gauge at 10-year intervals.

2. Method of Deriving the Sea-level Allowance

Extreme value theory develops techniques and models for describing the rare extreme events, rather than the usual, such as annual maximum sea levels (Coles, 2001). The model is expressed in the form of extreme value distributions, with type I distributions widely known as the Gumbel family. The Gumbel distribution has proved very useful in analysis of annual maxima of hourly measurements of sea level in the northwest Atlantic (Bernier and Thompson, 2006; Xu et al., 2013). Some basic statistics to describe the likelihood of sea-level extremes (Pugh, 1996; Hunter, 2012a), derived from the Gumbel distribution function, are related by

$$1 - E = \exp\left(-\frac{T}{R}\right) = \exp(-N) = \exp\left[-\exp\left\{\frac{\mu - z}{\lambda}\right\}\right], \quad (1)$$

where E is the exceedance probability, R is the return period, $N = T/R$ is the average number of exceedances in a period of duration T, μ is the location parameter, λ is the scale parameter and z is the return level. Here μ and λ reflect the y-axis intercept and slope of the return-level line shown in the left hand panels of Appendix A. The return period is the average period between extreme events (observed over a long period with many events) and the exceedance probability is the probability of at least one exceedance event happening when T=1.

Sea-level rise will increase the likelihood of future sea-level extremes. One common adaptation to sea-level rise is to raise the infrastructure by an amount that is sufficient to achieve a required level of precaution. There has been lack of objective method for the selection of such an amount. Hunter (2012a) describes a simple technique for estimating future sea-level allowances by combining the statistics of present extreme sea levels and projections of the rise in mean sea levels and their associated uncertainties. This allowance ensures that the expected, or average, number of extreme (flooding) events in a given period is preserved (Hunter et al.,

2013). In other words, any asset raised by this allowance would experience the same frequency of flooding events under sea-level rise as it would without the allowance and without sea-level rise (Hunter et al., 2013). Following Hunter (2012a), assuming a normal or Gaussian distribution for the uncertainty distribution of the sea-level rise projections, the overall expected number of exceedance values, N_{ov}, under sea-level rise is given by

$$N_{ov} = Nexp[\frac{\Delta z + \frac{\sigma^2}{2\lambda} - a}{\lambda}], \quad (2)$$

where Δz is the central value of the estimated rise, σ is the standard deviation of the uncertainty in the rise and a is the amount by which a coastal asset is raised to allow for sea-level rise. N is the expected number of exceedances in the absence of sea-level rise and with the asset at its original height. In order to ensure that the expected number of extreme events in a given period remains the same as it would without sea-level rise, we require $N_{ov} = N$. Therefore the allowance, a, is given by

$$a = \Delta z + \frac{\sigma^2}{2\lambda}. \quad (3)$$

The standard deviation (SD), σ, is derived from 5- and 95-percentile limits of the AR5 projections assuming that the uncertainty is normally distributed. The standard deviation σ is converted from the 5- to 95-percentile half-range by multiplying by 0.608 (assuming a normal distribution). The allowance approach does not take into account possible changes in the variability about mean sea level, such as that due to changes in storminess or abrupt changes in the coastline that follow major seismic events such as that predicted for a failure along the Cascadian Subduction Zone off the west coast of Canada.

The temporal evolution of the allowance for RCP8.5 scenario is shown in Fig. 2. The allowance is calculated for two tide gauge stations, Halifax and Shediac Bay, which have Gumbel scale parameters of 0.101 and 0.225 m respectively. Fig. 2 shows that the allowance for Halifax follows closely the mean+0.5×SD until about 2060 after which it moves towards the 95% (upper) limit. The allowance rises faster for locations with small scale parameter, and a small scale parameter makes the number of extremes more sensitive to sea level rise (Hunter, 2012b; Zhai et al., 2013).

3. Tide-gauge data and analysis results

The hourly water level data for 56 tide-gauge stations were provided by the DFO's Integrated Science Data Management (http://www.isdm-gdsi.gc.ca/isdm-gdsi/twl-mne/maps-cartes/inventory-inventaire-eng.asp), National Oceanic and Atmospheric Administration (http://www.co-ops.nos.noaa.gov/), and Sea Level Centre at the University of Hawaii (http://uhslc.soest.hawaii.edu). The tide gauges measure sea level relative to the land. The zero water levels at Canadian tide gauges are the local Canadian Hydrographic Service Chart Datum. Most of tide gauge stations (Figure 1) have records of water levels generally longer than 30 years (Table 1), which is typically needed for a satisfactory extremal analysis (Pugh, 1996). Because of the lack of historical data in the Arctic and along the Labrador shelf, we kept Prudhoe Bay, Tuktoyaktuk and Nain in our analysis even though their record length is relatively short. Prior to

extremal analysis, the tide-gauge data were processed as follows: 1) remove non-physical outliers identified as large numbers or by a clear vertical offset, 2) linearly de-trend hourly water levels, 3) select years for which each month contains at least some data, and 4) compute annual maxima and ensure any extreme events were at least 3 days apart such that any extreme events closer than this were counted as a single event (Hunter, 2012a). The cut-off at 3 days is used in order to prevent "double counting" of extremes. A storm surge can last several days, but the tides will cause it to come and go over that period. If a semidiurnal tide is dominant, then you could record multiple "extremes" in this time when in fact there is only one.

The exceedance probability of the annual maxima above a given level generally follows a Poisson distribution. The annual maxima are fitted to a Gumbel distribution using the evfit function in MATLAB. The software computes the maximum likelihood estimation of the cumulative density function (1-E), and the 95% confidence bounds associated with the function. It should be noted that "E" as used here is the annual exceedance probability. The complementary cumulative distribution of annual maxima describes the probability of water levels higher than a threshold. Left panels in Appendix A show fitted return-level lines in black, and the ordered, observed detrended annual maxima in red dots. Right panels in Appendix A show the curves of exceedance probability versus water levels and the ordered, observed detrended annual maxima in red dots. The fitted curves for each tide gauge site (Appendix A) agree reasonably well with the ordered annual maxima marked by the red dots. The return-level curves (Appendix A) show that the 95% confidence range increases with increasing return period since the data provide increasingly weaker information as the water levels become higher (Coles, 2001).

The Gumbel scale parameter (λ; Table 2) depends in a subtle way on both the distribution of tidal heights and the distribution of surge heights. The scale parameter is relatively large in the Arctic (0.17 to 0.24 m), the head of St. Lawrence Estuary (0.19 m), and the south shore of the Northumberland Strait (0.19 to 0.22 m) where surges are typically large (Henry and Heaps, 1976; Zhang and Sheng, 2013; Bernier and Thompson, 2006). The parameter ranges from 0.1 to 0.15 m along the coast of British Columbia, and from 0.08 to 0.23 m along the east coast of Canada. The smaller scale parameter indicates that the return period is sensitive to quite small changes in mean sea-level rise.

4. AR5 Projections of regional sea-level rise

A recent report on sea-level allowances for Atlantic Canada (Zhai et al., 2013) used regional projections of the Fourth Assessment Report (AR4) of IPCC, which was fully described by Hunter et al. (2013, Appendix 1), and was based on the A1FI emission scenario. The allowances presented here are based on the RCP4.5 and RCP8.5 scenarios from the IPCC's AR5 (IPCC, 2013). RCP8.5 and A1FI are the highest emission scenarios for AR5 and AR4 respectively for the 21st century (www.skepticalscience.com/rcp.php), and the A1FI emission scenario of IPCC's AR4 is broadly used for sea level studies throughout the world at present (Le Quéré et al., 2009).

An important difference in the regional projections between Hunter et al. (2013) and AR5 is that no uncertainty was estimated for GIA in Hunter et al. (2013), whereas AR5 estimated the

uncertainty for GIA using two GIA models. GIA, glacial isostatic adjustment, is the delayed response of the Earth to the surface loading and unloading caused by the advance and retreat of continental ice sheet during the last ice age (James et al., 2013). In AR5 (Church et al., 2013b), the GIA contribution was calculated from the mean of the ICE-5G model (Peltier, 2004) and the ANU ice sheet model (Lambeck et al. 1998 and subsequent improvements) with the SELEN code for the sea level equation (Farrell and Clark, 1976; Spada and Stocchi, 2006, 2007), including updates to allow for coastline variation through time, near-field meltwater damping and Earth rotation in a self-consistent manner (Milne and Mitrovica, 1998; Kendall et al., 2006).

The regional projections of the AR5 include effects of steric and dynamic changes, atmospheric loading, plus land ice, GIA and terrestrial water sources (Figures 19 and 20 in Church et al., 2013a). The steric and dynamic changes are derived from 21 Coupled Model Intercomparison Project phase 5 (CMIP5) Atmosphere-Ocean General Circulation Models (AOGCMs). Annual time series of the AR5 regional projections were used to derive the allowances at 10-year intervals. As an example, Figure 3 shows the mean and standard deviation of regional sea level change between 1995 and 2099 for RCP4.5 and RCP8.5. IPCC's AR5 (Church et al., 2013a) concluded that for the 21st century, past, present and future loss of land-ice mass will very likely be an important contributor to spatial patterns in relative sea level change. The regional sea-level rise along the Pacific coast of Canada is predicted to be smaller than that along the east coast of Canada. There is a sea level fall of ~ 1 m in Churchill, Hudson Bay, where the standard deviation of its uncertainty is the largest.

GIA model projections of the IPCC's AR5 (Figure 3, middle column) show that in Canada there are substantial spatial variations and large uncertainties in the relative sea-level change. The mean values of GIA model projections are generally consistent with Global Positioning System (GPS) or empirical estimates. In western Hudson Bay, the estimate of vertical land uplift derived from empirical isobase rates is about 8±2 mm yr^{-1} (James et al., 2011). The isobase rates are derived from radiocarbon dates acquired by numerous Arctic field scientists over many years. For western Canada and the northwestern United States, postglacial rebound and tectonics are significant and lead to a reduced, and even negative, sea-level rise (Mazzotti et al., 2008). For eastern Canada, GPS estimates of vertical land motion range from uplifts of 1 to 4.5 mm yr^{-1} for Québec to subsidence of up to 2 mm yr^{-1} for Nova Scotia and Prince Edward Island (James et al., 2013).

The regional sea-level projections without GIA effects are shown in Figure 3 (right column). It has been suggested that steric and dynamical sea level changes can potentially increase the sea level near the northeastern coast of North America (Sallenger et al., 2012) and in the western Pacific (Hu et al., 2011). For example, a weakening of the Atlantic Meridional Overturning Circulation (AMOC) would lead to a local steric sea-level rise off the east coast of North America, resulting in more water on the shelf (Yin et al., 2010). AR5 regional projections are defined on a 1° longitude × 1° latitude coarse-resolution grid which cannot resolve the details of coastline, therefore bilinear interpolation of these fields resulted in no values at some tide gauge locations along the coast.

The procedure to derive projections at tide gauge stations involves two steps. Firstly distance-weighted averages of nearest 9 grid points are applied to 1° × 1° coastal grid boxes where projections are not available. This step created extended fields of AR5 projections. Secondly, bilinear interpolation of the extended fields is applied to tide gauge locations. Because the GIA component of the regional sea-level change is available globally (Figure 3, middle

column), the GIA component can be interpolated at tide gauge locations using bilinear interpolation. Two sets of sea-level projections at tide gauge locations have therefore been computed:

1. projections based on distance-weighted averages and bilinear interpolation of the regional sea-level projections, using ocean points only, and
2. projections based on the distance-weighted averages and bilinear interpolation of the regional sea-level projections without GIA, using ocean points only, plus bilinear interpolation of GIA projections, using ocean and land points.

The coastal projections (2), referred to here as the corrected projections, are generally better than (1), referred to here as the uncorrected projections, because GIA projections at tide gauge sites are better represented using more data. The corrected allowances are slightly smaller than the uncorrected ones. The difference in the resulting allowances is about 0 to 0.13 m for years 1995-2050 (Tables 5 and 6) and 0 to 0.27 m for years 1995-2099 (Tables 7 and 8) for RCP8.5. Hunter (2014) developed a similar method to derive the corrected projections with the "distance-weighted average" replaced by the "variants of linear interpolation". For the final allowances presented here, the corrected projections (2) have been used.

5. Regional sea-level allowances

The sea-level allowances have been derived at 10-year intervals for 56 tide gauge sites using Equation 3 (Tables 3 and 4, 5 and 7, Figures 4 and 5, Appendix B). The input data are the scale parameters, means and standard deviation of regional sea-level change for two RCPs. There are therefore two groups of allowances:

1. allowances for the RCP4.5, and
2. allowances for the RCP8.5.

A comparison of Tables 3 and 5 shows that the allowances estimated for the RCP4.5 are slightly smaller than those for the RCP8.5 by about 0.03 m (averaged for 56 stations) for the period 1995-2050. Comparison of Tables 4 and 7 shows that the allowances estimated for the RCP4.5 are smaller than those for the RCP8.5 by about 0.23 m (averaged for 56 stations) for the period 1995-2099. It is recommended that sea-level allowances should be based on the allowances derived for the RCP8.5 because recent emissions are tracking closer to RCP8.5 than other RCPs (Peters et al., 2012). The allowances derived for the RCP4.5 have been included here for completeness.

For both the RCP4.5 and RCP8.5 (Figures 4 and 5), the allowances at tide gauge sites along the east coast of Canada are larger than those on the Pacific coast, mainly because of greater contributions from GIA and steric and dynamical effects on the east coast. The vertical land motion in Hudson Bay contributes a significant fall in sea level, leading to negative allowances in Churchill during the 21st century. The spatial pattern of the allowances for AR5 is similar to that for the AR4 A1FI emission scenario (Figure 4 in Hunter et al., 2013), but the magnitude is larger for AR5. The following sections describe sea-level allowances for the RCP8.5 for periods of 1995-2050 and 1995-2099.

a. 1995-2050

For the RCP8.5 and the period 1995-2050, the allowances at the tide gauges (Table 5 and Figure 5) are regionally variable, ranging from 0.08 to 0.22 m for the Pacific coast and from 0.13 to 0.45 m for the east coast of Canada. Allowances are -0.31 m for Churchill, Hudson Bay and 0.3 m for Tuktoyaktuk.

b. 1995-2099

For the RCP8.5 and the period 1995-2099, the allowances at the tide gauges (Table 7 and Figure 5) show larger spatial variability than those for the period 1995-2050, ranging from 0.36 to 0.67 m for the Pacific coast and from 0.52 to 1.32 m for the east coast of Canada. Allowances are -0.05 m for Churchill and 0.78 m for Tuktoyaktuk.

6. Conclusions

This report provides a brief overview of the scientific basis and the methodology for deriving sea-level allowances for 56 stations along the coasts of Canada and the adjacent United States. The tide-gauge data have been analyzed to determine the statistics of storm tides. The scale parameters have been derived from a Gumbel extreme values distribution fitted to the cumulative distribution function of ranked annual maxima of linearly detrended hourly water levels. The scale parameter along the Arctic coast is generally larger than those along the Pacific coast, and the Atlantic coast.

The regional projections of sea-level change used in this report (Table 7, Appendix B, Columns 3-6) were based on the IPCC's AR5, including effects of atmospheric loading, plus land ice, glacial isostatic adjustment (GIA) and terrestrial water sources. For the 21st century, the relative sea level is falling in Hudson Bay due to vertical land uplift caused by GIA. The sea level rise along the east coast of North America is greater than that along the coasts of Pacific and the Arctic.

The sea level allowances for the 21st century at 10-year intervals (Table 7, Appendix B, Column 7) have been derived at 56 tide-gauge stations for the coast of Canada and adjacent US following the methodology of Hunter et al. (2013). This allowance depends only on the projected rise in mean sea level and its uncertainty, and on the scale parameter of a Gumbel distribution. An important property of the allowance is that it is independent of the required level of precaution (Hunter, 2014). The allowances show large spatial variation, a consequence of using spatially-varying sea-level change and Gumbel scale parameters.

A recent study shows that sea level would rise more than predicted by the AR5 associated with the collapse of west Antarctic ice sheet (Joughin et al., 2014). Talke et al. (2014) suggests that annual maximum storm tides in New York Harbor contain both multidecadal variability and a secular trend in each quartile. Sea-level allowances are also subjected to a number of caveats given in Hunter (2014). Collectively, these may indicate that we are being conservative in the estimates of sea-level allowances based on the IPCC's AR5 report, but given the state of knowledge and consensus at this time we would recommend to continue to use the sea level allowances based on the IPCC's AR5 projections for planning purposes.

7. Future steps

The newly compiled and complete Canadian tide-gauge data set could potentially contribute to the GESLA (Global Extreme Sea-Level Analysis) sea-level database (Menéndez and Woodworth, 2010). The regional sea-level change based on the latest IPCC's AR5 could be used as an updated input variable to the coastline sensitivity index (SI) developed by Shaw et al., (1998). The SI is an objective matrix to predict the degree to which Canadian coasts are sensitive to future sea-level change. In Shaw et al. (1998a; 1998b), the sea-level tendency, one of the input variables, was simply determined from the tide gauge data and radiocarbon curves. Additional information on extreme water levels could be also included to develop new sensitivity indices.

The Canadian Pacific coast is a region where the tectonics varies strongly spatially, and global GIA models do not take into account its effect. The uncertainty associated with GIA models is the largest in Hudson Bay. In order to better estimate the allowances in these regions, substituting the GPS rates as a component of regional sea-level rise will require a significant effort. In order to estimate allowances for the whole Canadian coastlines, storm surge model hindcast will be required to provide the scale parameters. On the east coast of Canada, Dalcoast (Bernier and Thompson, 2006) storm surge model hindcast will be used to estimate allowances at coastal sites that do not have tide gauge records. On the Canadian Pacific coast, it may be possible to get storm-surge model outputs from the British Columbia Storm Surge Program headed by one of the authors of this report (RT) (Tinis, 2014), but the Arctic will remain a significant modeling challenge.

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Glossary of terms

ACCASP is the Aquatic Climate Change Adaptation Services Program of the federal Department of Fisheries and Oceans.

AR4 Fourth Assessment Report of the Intergovernmental Panel on Climate Change.

AR5 Fifth Assessment Report of the Intergovernmental Panel on Climate Change.

A1 emission scenario is an **IPCC** scenario that describes a future world of very rapid economic growth, a global population that peaks in the mid-century and declines thereafter, and the rapid introduction of new and more efficient technologies. See **SRES** below.

A1FI emission scenario is an **IPCC's AR4** scenario and is a fossil intensive and high economic growth scenario, the highest **SRES** scenario, and belongs to the **A1** storyline and scenario family. See **SRES** below.

Complementary distribution function or Exceeding probability (*E*) describes the probability of water levels higher than a threshold.

Exceedance events are events which occur when water levels exceed a given level.

Glacial isostatic adjustment (GIA), also called postglacial rebound, is the delayed response of the Earth to surface unloading caused by deglaciation at the end of the last Ice Age.

IPCC is the Intergovernmental Panel on Climate Change.

RCPs are the representative concentration pathways designed for AR5, and defined a set of four scenarios, based on the prescribed concentrations of greenhouse gases and aerosols. The four scenarios are identified by the 21st century peak and stabilization value of the radiative forcing (Box 1.1 in Cubasch et al., 2013). The medium-low RCP4.5 aims for stabilization at 4.5 W m^{-2} around 2100. The highest RCP8.5 implies a RF of 8.5 W m^{-2} by 2100, but implies rising RF beyond that data.

RPSS stands for Real Property, Safety and Security, a sector of the federal Department of Fisheries and Oceans.

SCH stands for Small Craft Harbours, a sector of the federal Department of Fisheries and Oceans.

Sea level allowances are changes in the elevation of infrastructure required to maintain the current level of flooding risk in a future scenario of sea level rise.

SRES is the Special Report on Emissions Scenarios, published by the IPCC in 2000 (Nakicenovic et al., 2000). It has provided the climate projections for the Fourth Assessment Report (**AR4**) of the IPCC.

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TABLES

Table 1a: Summary of tide-gauge data at stations located along the **Canadian Pacific and Arctic coasts**. The last column is the number of years used for extreme analysis.

Station Name	Longitude (°) W	Latitude (°) N	Station ID	Data Period	Years of Data
Alert Bay, BC	-126.93	50.59	8280	1948-1979	30
Bamfield, BC	-125.14	48.84	8545	1970-2012	40
Bella Bella, BC	-128.14	52.16	8976	1906-2012	50
Campbell River, BC	-125.25	50.04	8074	1965-2012	39
Churchill, MB	-94.18	58.77	5010	1929-2012	64
Fulford Harbour, BC	-123.45	48.77	7330	1953-1992	37
New Westminster, BC	-122.91	49.20	7654	1969-2012	40
Patricia Bay, BC	-123.45	48.65	7277	1976-2012	36
Point Atkinson, BC	-123.25	49.34	7795	1914-2012	68
Port Hardy, BC	-127.49	50.72	8408	1964-2012	45
Prince Rupert, BC	-130.32	54.32	9354	1909-2012	78
Queen Charlotte City, BC	-132.07	53.25	9850	1957-2012	51
Tofino, BC	-125.91	49.15	8615	1910-2012	70
Tuktoyaktuk, BC	-132.99	69.44	6485	1961-2012	15
Vancouver, BC	-123.11	49.29	7735	1910-2012	84
Victoria Harbour, BC	-123.37	48.42	7120	1909-2012	54

Table 1b: Summary of tide-gauge data at stations located along the **Canadian Atlantic coast**. The last column is the number of years used for extreme analysis.

Station Name	Longitude (°) W	Latitude (°) N	Station ID	Data Period	Years of Data
Argentia, NL	-53.98	47.30	835	1971-2013	43
Cap-aux-Meules, QC	-61.86	47.38	1970	1964-2013	18
Charlottetown, PEI	-63.12	46.23	1700	1911-2013	92
Halifax, NS	-63.58	44.67	490	1920-2013	94
Harrington Harbour, QC	-59.48	50.50	2550	1940-1989	47
Lauzon, QC	-71.16	46.83	3250	1900-2012	100
Lower Escuminac, NB	-64.88	47.08	2000	1973-2013	41
Nain, NL	-61.68	56.55	1430	1964-2013	23
North Sydney, NS	-60.25	46.22	612	1970-2013	44
Pictou, NS	-62.70	45.68	1630	1957-1995	33
Pointe-au-Père, QC	-68.47	48.52	2980	1900-1983	72
Port aux Basques, NL	-59.13	47.57	665	1936-2013	55
Rimouski, QC	-68.51	48.48	2985	1984-2013	30
Rivière-au-Renard, QC	-64.38	49.00	2330	1969-2013	44
Saint John, NB	-66.06	45.25	65	1905-2013	95
Sainte-Anne-des-Monts, QC	-66.49	49.13	2935	1969-1997	28
Saint-François IO, QC	-70.81	47.00	3100	1962-2013	52
Saint-Joseph-de-la-Rive, QC	-70.37	47.45	3057	1969-2013	44
Sept-Îles, QC	-66.38	50.19	2780	1972-2013	42
Shediac Bay, NB	-64.55	46.23	1805	1972-2013	28
St John's, NL	-52.72	47.57	905	1936-2013	60
Yarmouth, NS	-66.12	43.83	365	1900-2013	49

Table 1c: Summary of tide-gauge data at stations located along the coast of **the United States**. The last column is the number of years used for extreme analysis. The stations are grouped according to the states of Alaska, Washington, Massachusetts and Maine.

Station Name	**Longitude (°) W**	**Latitude (°) N**	**Data Period**	**Years of Data**
Cordova, AK	-145.75	60.56	1964-2012	40
Ketchikan, AK	-131.63	55.33	1918-2012	70
Kodiak, AK	-152.51	57.73	1975-2012	33
Prudhoe Bay, AK	-148.51	70.39	1993-2012	19
Seldovia, AK	-151.72	59.44	1975-2012	32
Seward, AK	-149.43	60.12	1967-2012	38
Sitka, AK	-135.34	57.05	1938-2012	72
Valdez, AK	-146.36	61.13	1973-2012	32
Yakutat, AK	-139.74	59.55	1961-2012	43
Cherry Point, WA	-122.76	48.86	1972-2013	33
Friday Harbour, WA	-123.01	48.55	1934-2013	75
Neah Bay, WA	-124.62	48.37	1935-2012	75
Port Angeles, WA	-123.44	48.13	1980-2013	33
Port Townsend, WA	-122.76	48.11	1972-2013	38
Toke Point, WA	-123.97	46.71	1973-2013	36
Boston, MA	-71.05	42.35	1921-2012	90
Eastport, ME	-66.99	44.91	1929-2012	72
Portland, ME	-70.25	43.66	1910-2012	91

Table 2a: Scale parameters (λ) of Gumbel distribution and 95% confidence intervals for the parameter estimates at tide-gauge stations along the **Canadian Pacific and Arctic coasts**.

Station Name	**Scale Parameter, λ (metres)**	**95% confidence interval (metres)**	
Alert Bay	0.129	0.098	0.169
Bamfield	0.129	0.103	0.162
Bella Bella	0.134	0.108	0.165
Campbell River	0.145	0.114	0.183
Churchill	0.166	0.137	0.201
Fulford Harbour	0.141	0.111	0.178
New Westminster	0.152	0.120	0.193
Patricia Bay	0.126	0.100	0.159
Point Atkinson	0.122	0.102	0.146
Port Hardy	0.101	0.080	0.128
Prince Rupert	0.153	0.130	0.181
Queen Charlotte City	0.140	0.114	0.171
Tofino	0.137	0.115	0.163
Tuktoyaktuk	0.242	0.160	0.365
Vancouver	0.119	0.101	0.140
Victoria Harbour	0.138	0.113	0.167

Table 2b: Scale parameters (λ) of Gumbel distribution and 95% confidence intervals for the parameter estimates at tide-gauge stations along the **east coast of Canada.**

Station Name	**Scale Parameter, λ (metres)**	**95% confidence interval (metres)**	
Argentia	0.09	0.048	0.132
Cap-aux-Meules	0.114	0.03	0.198
Charlottetown	0.156	0.106	0.206
Halifax	0.101	0.068	0.134
Harrington Harbour	0.113	0.062	0.164
Lauzon	0.19	0.132	0.248
Lower Escuminac	0.149	0.076	0.222
Nain	0.108	0.039	0.177
North Sydney	0.117	0.063	0.171
Pictou	0.185	0.089	0.281
Pointe-au-Père	0.123	0.083	0.163
Port aux Basques	0.08	0.046	0.114
Rimouski	0.102	0.044	0.16
Rivière-au-Renard	0.106	0.055	0.157
Saint John	0.109	0.076	0.142
Sainte-Anne-des-Monts	0.112	0.043	0.181
Saint-François IO	0.185	0.102	0.268
Saint-Joseph-de-la-Rive	0.159	0.082	0.236
Sept-Îles	0.134	0.072	0.196
Shediac Bay	0.225	0.094	0.356
St John's	0.081	0.049	0.113
Yarmouth	0.101	0.056	0.146

Table 2c: Scale parameters (λ) of Gumbel distribution and 95% confidence intervals for the parameter estimates at tide-gauge stations along the coast of the **United States.** The stations are grouped according to the states of Alaska, Washington, Massachusetts and Maine.

Station Name	**Scale Parameter, λ (metres)**	**95% confidence interval (metres)**	
Cordova	0.119	0.093	0.151
Ketchikan	0.142	0.119	0.168
Kodiak	0.109	0.082	0.144
Prudhoe Bay	0.188	0.133	0.265
Seldovia	0.144	0.111	0.188
Seward	0.111	0.087	0.142
Sitka	0.112	0.094	0.133
Valdez	0.121	0.093	0.158
Yakutat	0.138	0.111	0.172
Cherry Point	0.145	0.114	0.184
Friday Harbour	0.135	0.115	0.159
Neah Bay	0.131	0.111	0.154
Port Angeles	0.130	0.100	0.169
Port Townsend	0.142	0.113	0.179
Toke Point	0.189	0.148	0.241
Boston	0.136	0.115	0.160
Eastport	0.083	0.069	0.099
Portland	0.107	0.091	0.126

Table 3a: Summary of projected sea-level change and sea level allowances for RCP4.5 and years 1995-2050 at tide-gauge stations along the **Canadian Pacific and Arctic coasts.** Sea-level rise projections are **corrected**.

Station Name	Scale Parameter (metres)	RCP4.5 Projection (metres)				Allowance (metres)
		Mean	Standard deviation	5% percentile	95% percentile	
Alert Bay	0.129	0.11	0.04	0.04	0.17	0.11
Bamfield	0.129	0.16	0.05	0.08	0.24	0.17
Bella Bella	0.134	0.07	0.05	-0.01	0.15	0.08
Campbell River	0.145	0.11	0.05	0.03	0.19	0.11
Churchill	0.166	-0.59	0.28	-1.04	-0.14	-0.36
Fulford Harbour	0.141	0.13	0.05	0.06	0.21	0.14
New Westminster	0.152	0.11	0.04	0.04	0.18	0.11
Patricia Bay	0.126	0.14	0.05	0.06	0.22	0.15
Point Atkinson	0.122	0.11	0.04	0.04	0.18	0.12
Port Hardy	0.101	0.11	0.04	0.04	0.18	0.12
Prince Rupert	0.153	0.07	0.05	0.00	0.15	0.08
Queen Charlotte City	0.140	0.16	0.06	0.06	0.27	0.18
Tofino	0.137	0.16	0.05	0.08	0.24	0.17
Tuktoyaktuk	0.242	0.24	0.06	0.15	0.34	0.25
Vancouver	0.119	0.11	0.04	0.04	0.18	0.12
Victoria Harbour	0.138	0.14	0.05	0.06	0.23	0.15

Table 3b: Summary of projected sea-level change and sea level allowances for RCP4.5 and years 1995-2050 at tide-gauge stations along the **east coast of Canada.** Sea-level rise projections are **corrected**.

Station Name	Scale Parameter (metres)	RCP4.5 Projection (metres)				Allowance (metres)
		Mean	Standard deviation	5% percentile	95% percentile	
Argentia	0.09	0.30	0.07	0.18	0.41	0.32
Cap-aux-Meules	0.114	0.28	0.17	0.00	0.55	0.40
Charlottetown	0.156	0.26	0.13	0.04	0.48	0.32
Halifax	0.101	0.28	0.09	0.13	0.43	0.32
Harrington Harbour	0.113	0.06	0.08	-0.06	0.19	0.09
Lauzon	0.19	0.07	0.14	-0.16	0.29	0.11
Lower Escuminac	0.149	0.25	0.16	-0.01	0.52	0.34
Nain	0.108	-0.14	0.27	-0.58	0.29	0.18
North Sydney	0.117	0.31	0.11	0.12	0.49	0.36
Pictou	0.185	0.28	0.11	0.09	0.47	0.32
Pointe-au-Père	0.123	0.10	0.17	-0.17	0.38	0.22
Port aux Basques	0.08	0.26	0.12	0.07	0.46	0.35
Rimouski	0.102	0.10	0.17	-0.17	0.38	0.24
Rivière-au-Renard	0.106	0.20	0.18	-0.10	0.50	0.35
Saint John	0.109	0.21	0.10	0.04	0.38	0.26
Sainte-Anne-des-Monts	0.112	0.14	0.17	-0.14	0.42	0.27
Saint-François IO	0.185	0.07	0.14	-0.16	0.30	0.12
Saint-Joseph-de-la-Rive	0.159	0.07	0.15	-0.18	0.32	0.14
Sept-Îles	0.134	0.03	0.15	-0.22	0.29	0.12
Shediac Bay	0.225	0.25	0.13	0.02	0.47	0.29
St John's	0.081	0.30	0.08	0.17	0.43	0.34
Yarmouth	0.101	0.24	0.09	0.10	0.38	0.28

Table 3c: Summary of projected sea-level change and sea level allowances for RCP4.5 and years 1995-2050 at tide-gauge stations along the coast of **the United States.** The stations are grouped according to the states of Alaska, Washington, Massachusetts and Maine. Sea-level rise projections are **corrected**.

Station Name	Scale Parameter (metres)	RCP4.5 Projection (metres)				Allowance (metres)
		Mean	Standard deviation	5% percentile	95% percentile	
Cordova	0.119	0.13	0.07	0.02	0.24	0.15
Ketchikan	0.142	0.10	0.06	0.01	0.20	0.11
Kodiak	0.109	0.18	0.07	0.06	0.31	0.21
Prudhoe Bay	0.188	0.24	0.08	0.10	0.37	0.25
Seldovia	0.144	0.16	0.07	0.05	0.28	0.18
Seward	0.111	0.15	0.07	0.04	0.26	0.17
Sitka	0.112	0.15	0.05	0.07	0.24	0.16
Valdez	0.121	0.13	0.07	0.02	0.24	0.15
Yakutat	0.138	0.12	0.07	0.01	0.24	0.14
Cherry Point	0.145	0.12	0.05	0.05	0.20	0.13
Friday Harbour	0.135	0.14	0.05	0.06	0.22	0.15
Neah Bay	0.131	0.17	0.05	0.08	0.25	0.18
Port Angeles	0.130	0.16	0.05	0.07	0.24	0.17
Port Townsend	0.142	0.15	0.05	0.07	0.23	0.16
Toke Point	0.189	0.21	0.05	0.12	0.29	0.21
Boston	0.136	0.25	0.11	0.07	0.43	0.30
Eastport	0.083	0.19	0.10	0.03	0.36	0.25
Portland	0.107	0.20	0.11	0.01	0.38	0.25

Table 4a: Summary of projected sea-level change and sea level allowances for RCP4.5 and years 1995-2099 at tide-gauge stations along the **Canadian Pacific and Arctic coasts.** Sea-level rise projections are **corrected**.

Station Name	Scale Parameter (metres)	RCP4.5 Projection (metres)				Allowance (metres)
		Mean	Standard deviation	5% percentile	95% percentile	
Alert Bay	0.129	0.26	0.12	0.07	0.45	0.31
Bamfield	0.129	0.38	0.14	0.15	0.61	0.46
Bella Bella	0.134	0.21	0.14	-0.02	0.43	0.28
Campbell River	0.145	0.28	0.14	0.05	0.50	0.34
Churchill	0.166	-1.14	0.53	-2.01	-0.27	-0.30
Fulford Harbour	0.141	0.33	0.13	0.12	0.54	0.38
New Westminster	0.152	0.28	0.12	0.08	0.48	0.33
Patricia Bay	0.126	0.33	0.13	0.12	0.54	0.40
Point Atkinson	0.122	0.28	0.13	0.07	0.49	0.35
Port Hardy	0.101	0.26	0.11	0.08	0.45	0.32
Prince Rupert	0.153	0.18	0.13	-0.03	0.40	0.24
Queen Charlotte City	0.140	0.39	0.15	0.14	0.64	0.48
Tofino	0.137	0.38	0.14	0.15	0.61	0.45
Tuktoyaktuk	0.242	0.52	0.16	0.26	0.78	0.57
Vancouver	0.119	0.28	0.12	0.08	0.49	0.35
Victoria Harbour	0.138	0.35	0.13	0.14	0.56	0.41

Table 4b: Summary of projected sea-level change and sea level allowances for RCP4.5 and years 1995-2099 at tide-gauge stations along **the Canadian Atlantic coast.** Sea-level rise projections are **corrected**.

Station Name	Scale Parameter (metres)	RCP4.5 Projection (metres)				Allowance (metres)
		Mean	Standard deviation	5% percentile	95% percentile	
Argentia	0.09	0.57	0.17	0.30	0.84	0.72
Cap-aux-Meules	0.114	0.53	0.33	-0.01	1.08	1.02
Charlottetown	0.156	0.52	0.27	0.07	0.96	0.76
Halifax	0.101	0.56	0.21	0.21	0.91	0.78
Harrington Harbour	0.113	0.11	0.18	-0.18	0.41	0.26
Lauzon	0.19	0.14	0.30	-0.35	0.64	0.38
Lower Escuminac	0.149	0.49	0.33	-0.04	1.03	0.85
Nain	0.108	-0.30	0.51	-1.13	0.54	0.90
North Sydney	0.117	0.60	0.24	0.20	1.00	0.85
Pictou	0.185	0.55	0.24	0.15	0.95	0.71
Pointe-au-Père	0.123	0.21	0.36	-0.37	0.80	0.73
Port aux Basques	0.08	0.51	0.25	0.10	0.92	0.89
Rimouski	0.102	0.21	0.36	-0.37	0.80	0.83
Rivière-au-Renard	0.106	0.40	0.35	-0.18	0.98	0.99
Saint John	0.109	0.43	0.23	0.04	0.81	0.68
Sainte-Anne-des-Monts	0.112	0.28	0.36	-0.30	0.87	0.85
Saint-François IO	0.185	0.15	0.31	-0.36	0.66	0.41
Saint-Joseph-de-la-Rive	0.159	0.15	0.32	-0.38	0.69	0.48
Sept-Îles	0.134	0.08	0.33	-0.46	0.62	0.49
Shediac Bay	0.225	0.48	0.28	0.02	0.93	0.65
St John's	0.081	0.59	0.18	0.30	0.89	0.79
Yarmouth	0.101	0.48	0.20	0.15	0.81	0.68

Table 4c: Summary of projected sea-level change and sea level allowances for RCP4.5 and years 1995-2099 at tide-gauge stations along the coast of **the United States.** The stations are grouped according to the states of Alaska, Washington, Massachusetts and Maine. Sea-level rise projections are **corrected.**

Station Name	Scale Parameter (metres)	RCP4.5 Projection (metres)				Allowance (metres)
		Mean	Standard deviation	5% percentile	95% percentile	
Cordova	0.119	0.29	0.16	0.03	0.55	0.40
Ketchikan	0.142	0.26	0.15	0.01	0.50	0.33
Kodiak	0.109	0.44	0.17	0.17	0.71	0.56
Prudhoe Bay	0.188	0.51	0.21	0.16	0.85	0.62
Seldovia	0.144	0.36	0.17	0.08	0.64	0.46
Seward	0.111	0.36	0.16	0.10	0.61	0.47
Sitka	0.112	0.35	0.14	0.12	0.57	0.43
Valdez	0.121	0.29	0.16	0.03	0.56	0.40
Yakutat	0.138	0.27	0.16	0.01	0.54	0.37
Cherry Point	0.145	0.30	0.12	0.10	0.51	0.36
Friday Harbour	0.135	0.33	0.13	0.12	0.55	0.40
Neah Bay	0.131	0.39	0.14	0.17	0.62	0.47
Port Angeles	0.130	0.37	0.13	0.15	0.59	0.44
Port Townsend	0.142	0.36	0.13	0.15	0.58	0.42
Toke Point	0.189	0.47	0.14	0.24	0.70	0.52
Boston	0.136	0.51	0.24	0.11	0.91	0.73
Eastport	0.083	0.40	0.23	0.02	0.77	0.72
Portland	0.107	0.41	0.24	0.01	0.81	0.69

Table 5a: Summary of projected sea-level change and sea level allowances for RCP8.5 and years 1995-2050 at tide-gauge stations along **the Canadian Pacific and Arctic coasts.** Sea-level rise projections are **corrected.**

Station Name	Scale Parameter (metres)	RCP8.5 Projection (metres)				Allowance (metres)
		Mean	Standard deviation	5% percentile	95% percentile	
Alert Bay	0.129	0.10	0.05	0.02	0.18	0.11
Bamfield	0.129	0.17	0.06	0.07	0.27	0.18
Bella Bella	0.134	0.08	0.06	-0.02	0.17	0.09
Campbell River	0.145	0.11	0.06	0.02	0.21	0.13
Churchill	0.166	-0.56	0.29	-1.03	-0.09	-0.31
Fulford Harbour	0.141	0.14	0.05	0.05	0.22	0.15
New Westminster	0.152	0.11	0.05	0.03	0.20	0.12
Patricia Bay	0.126	0.14	0.05	0.05	0.23	0.15
Point Atkinson	0.122	0.11	0.05	0.03	0.20	0.12
Port Hardy	0.101	0.10	0.05	0.02	0.18	0.11
Prince Rupert	0.153	0.07	0.05	-0.02	0.15	0.08
Queen Charlotte City	0.140	0.17	0.07	0.05	0.29	0.19
Tofino	0.137	0.17	0.06	0.07	0.26	0.18
Tuktoyaktuk	0.242	0.29	0.07	0.18	0.40	0.30
Vancouver	0.119	0.11	0.05	0.03	0.20	0.12
Victoria Harbour	0.138	0.15	0.05	0.06	0.24	0.16

Table 5b: Summary of projected sea-level change and sea level allowances for RCP8.5 and years 1995-2050 at tide-gauge stations along **the Canadian Atlantic coast.** Sea-level rise projections are **corrected**.

Station Name	Scale Parameter (metres)	RCP8.5 Projection (metres)				Allowance (metres)
		Mean	Standard deviation	5% percentile	95% percentile	
Argentia	0.09	0.33	0.08	0.19	0.46	0.36
Cap-aux-Meules	0.114	0.31	0.18	0.02	0.60	0.45
Charlottetown	0.156	0.30	0.15	0.06	0.54	0.37
Halifax	0.101	0.32	0.11	0.13	0.50	0.38
Harrington Harbour	0.113	0.09	0.09	-0.06	0.24	0.13
Lauzon	0.19	0.08	0.16	-0.17	0.34	0.15
Lower Escuminac	0.149	0.28	0.18	-0.01	0.58	0.39
Nain	0.108	-0.12	0.27	-0.57	0.33	0.22
North Sydney	0.117	0.34	0.13	0.13	0.55	0.41
Pictou	0.185	0.31	0.13	0.10	0.52	0.36
Pointe-au-Père	0.123	0.12	0.18	-0.18	0.42	0.26
Port aux Basques	0.08	0.30	0.13	0.08	0.51	0.40
Rimouski	0.102	0.12	0.18	-0.18	0.42	0.29
Rivière-au-Renard	0.106	0.24	0.19	-0.08	0.55	0.40
Saint John	0.109	0.25	0.12	0.05	0.45	0.32
Sainte-Anne-des-Monts	0.112	0.16	0.18	-0.15	0.46	0.31
Saint-François IO	0.185	0.09	0.16	-0.17	0.35	0.16
Saint-Joseph-de-la-Rive	0.159	0.09	0.17	-0.19	0.36	0.18
Sept-Îles	0.134	0.05	0.17	-0.23	0.33	0.16
Shediac Bay	0.225	0.28	0.15	0.03	0.53	0.33
St John's	0.081	0.33	0.08	0.19	0.47	0.38
Yarmouth	0.101	0.28	0.11	0.10	0.45	0.33

Table 5c: Summary of projected sea-level change and sea level allowances for RCP8.5 and years 1995-2050 at tide-gauge stations along **the coast of the United States.** The stations are grouped according to the states of Alaska, Washington, Massachusetts and Maine. Sea-level rise projections are **corrected.**

Station Name	Scale Parameter (metres)	RCP8.5 Projection (metres)				Allowance (metres)
		Mean	Standard deviation	5% percentile	95% percentile	
Cordova	0.119	0.13	0.07	0.01	0.25	0.15
Ketchikan	0.142	0.10	0.07	-0.01	0.21	0.12
Kodiak	0.109	0.20	0.08	0.07	0.33	0.23
Prudhoe Bay	0.188	0.27	0.08	0.14	0.41	0.29
Seldovia	0.144	0.17	0.08	0.04	0.29	0.19
Seward	0.111	0.16	0.07	0.04	0.28	0.18
Sitka	0.112	0.15	0.06	0.05	0.25	0.17
Valdez	0.121	0.13	0.07	0.01	0.25	0.16
Yakutat	0.138	0.12	0.08	0.00	0.24	0.14
Cherry Point	0.145	0.13	0.05	0.04	0.21	0.13
Friday Harbour	0.135	0.14	0.05	0.05	0.23	0.15
Neah Bay	0.131	0.17	0.06	0.08	0.27	0.19
Port Angeles	0.130	0.16	0.06	0.07	0.25	0.17
Port Townsend	0.142	0.16	0.06	0.07	0.25	0.17
Toke Point	0.189	0.21	0.06	0.12	0.31	0.22
Boston	0.136	0.27	0.12	0.06	0.47	0.32
Eastport	0.083	0.23	0.12	0.03	0.42	0.31
Portland	0.107	0.22	0.13	0.01	0.43	0.29

Table 6a: Summary of projected sea-level change and sea level allowances for RCP8.5 and years 1995-2050 at tide-gauge stations along **the Canadian Pacific and Arctic coasts.** Sea-level rise projections are **not corrected.**

Station Name	Scale Parameter (metres)	RCP8.5 Projection (metres)				Allowance (metres)
		Mean	Standard deviation	5% percentile	95% percentile	
Alert Bay	0.129	0.13	0.05	0.05	0.21	0.13
Bamfield	0.129	0.19	0.06	0.08	0.29	0.20
Bella Bella	0.134	0.09	0.06	-0.01	0.19	0.10
Campbell River	0.145	0.17	0.06	0.07	0.27	0.19
Churchill	0.166	-0.56	0.32	-1.09	-0.04	-0.26
Fulford Harbour	0.141	0.19	0.06	0.09	0.29	0.20
New Westminster	0.152	0.19	0.06	0.09	0.29	0.20
Patricia Bay	0.126	0.19	0.06	0.09	0.29	0.21
Point Atkinson	0.122	0.19	0.06	0.09	0.29	0.21
Port Hardy	0.101	0.11	0.05	0.03	0.18	0.12
Prince Rupert	0.153	0.07	0.05	-0.02	0.16	0.08
Queen Charlotte City	0.140	0.17	0.07	0.05	0.29	0.19
Tofino	0.137	0.18	0.06	0.08	0.28	0.19
Tuktoyaktuk	0.242	0.31	0.06	0.21	0.42	0.32
Vancouver	0.119	0.19	0.06	0.09	0.29	0.21
Victoria Harbour	0.138	0.19	0.06	0.10	0.29	0.20

Table 6b: Summary of projected sea-level change and sea level allowances for RCP8.5 and years 1995-2050 at tide-gauge stations along **the Canadian Atlantic coast.** Sea-level rise projections are **not corrected.**

Station Name	Scale Parameter (metres)	RCP8.5 Projection (metres)				Allowance (metres)
		Mean	Standard deviation	5% percentile	95% percentile	
Argentia	0.09	0.33	0.08	0.20	0.47	0.37
Cap-aux-Meules	0.114	0.31	0.18	0.02	0.60	0.45
Charlottetown	0.156	0.30	0.15	0.06	0.54	0.37
Halifax	0.101	0.32	0.11	0.14	0.50	0.38
Harrington Harbour	0.113	0.14	0.10	-0.03	0.31	0.19
Lauzon	0.19	0.16	0.18	-0.14	0.46	0.25
Lower Escuminac	0.149	0.29	0.19	-0.02	0.60	0.41
Nain	0.108	0.01	0.26	-0.41	0.43	0.32
North Sydney	0.117	0.34	0.13	0.13	0.55	0.41
Pictou	0.185	0.32	0.13	0.10	0.53	0.36
Pointe-au-Père	0.123	0.16	0.18	-0.14	0.46	0.30
Port aux Basques	0.08	0.30	0.13	0.08	0.51	0.40
Rimouski	0.102	0.16	0.18	-0.14	0.46	0.32
Rivière-au-Renard	0.106	0.24	0.19	-0.08	0.55	0.40
Saint John	0.109	0.25	0.11	0.06	0.43	0.30
Sainte-Anne-des-Monts	0.112	0.16	0.18	-0.14	0.46	0.31
Saint-François IO	0.185	0.16	0.18	-0.14	0.46	0.25
Saint-Joseph-de-la-Rive	0.159	0.16	0.18	-0.14	0.46	0.27
Sept-Îles	0.134	0.16	0.18	-0.14	0.46	0.29
Shediac Bay	0.225	0.29	0.16	0.02	0.57	0.35
St John's	0.081	0.33	0.08	0.20	0.47	0.38
Yarmouth	0.101	0.28	0.11	0.10	0.45	0.33

Table 6c: Summary of projected sea-level change and sea level allowances for RCP8.5 and years 1995-2050 at tide-gauge stations along **the coast of the United States.** The stations are grouped according to the states of Alaska, Washington, Massachusetts and Maine. Sea-level rise projections are **not corrected.**

Station Name	Scale Parameter (metres)	RCP8.5 Projection (metres)				Allowance (metres)
		Mean	Standard deviation	5% percentile	95% percentile	
Cordova	0.119	0.13	0.07	0.01	0.25	0.15
Ketchikan	0.142	0.12	0.07	0.00	0.23	0.13
Kodiak	0.109	0.20	0.08	0.07	0.33	0.23
Prudhoe Bay	0.188	0.27	0.08	0.14	0.41	0.29
Seldovia	0.144	0.17	0.08	0.04	0.29	0.19
Seward	0.111	0.17	0.07	0.05	0.28	0.19
Sitka	0.112	0.17	0.06	0.07	0.27	0.18
Valdez	0.121	0.14	0.07	0.02	0.26	0.16
Yakutat	0.138	0.12	0.07	0.00	0.24	0.14
Cherry Point	0.145	0.19	0.06	0.10	0.29	0.21
Friday Harbour	0.135	0.19	0.06	0.10	0.29	0.21
Neah Bay	0.131	0.19	0.06	0.09	0.30	0.21
Port Angeles	0.130	0.20	0.06	0.10	0.29	0.21
Port Townsend	0.142	0.20	0.06	0.10	0.29	0.21
Toke Point	0.189	0.22	0.06	0.12	0.31	0.23
Boston	0.136	0.28	0.12	0.08	0.48	0.33
Eastport	0.083	0.23	0.11	0.05	0.42	0.31
Portland	0.107	0.25	0.12	0.04	0.45	0.32

Table 7a: Summary of projected sea-level change and sea level allowances for RCP8.5 and years 1995-2099 at tide-gauge stations along **the Canadian Pacific and Arctic coasts.** Sea-level rise projections are **corrected.**

Station Name	Scale Parameter (metres)	RCP8.5 Projection (metres)				Allowance (metres)
		Mean	Standard deviation	5% percentile	95% percentile	
Alert Bay	0.129	0.37	0.15	0.13	0.61	0.45
Bamfield	0.129	0.50	0.18	0.20	0.80	0.63
Bella Bella	0.134	0.32	0.17	0.04	0.61	0.44
Campbell River	0.145	0.40	0.18	0.10	0.69	0.51
Churchill	0.166	-0.98	0.55	-1.89	-0.07	-0.05
Fulford Harbour	0.141	0.44	0.15	0.19	0.69	0.52
New Westminster	0.152	0.39	0.15	0.15	0.64	0.46
Patricia Bay	0.126	0.44	0.15	0.19	0.69	0.53
Point Atkinson	0.122	0.39	0.16	0.14	0.65	0.49
Port Hardy	0.101	0.37	0.14	0.15	0.60	0.46
Prince Rupert	0.153	0.29	0.15	0.04	0.53	0.36
Queen Charlotte City	0.140	0.52	0.19	0.20	0.84	0.65
Tofino	0.137	0.50	0.18	0.20	0.80	0.62
Tuktoyaktuk	0.242	0.69	0.21	0.36	1.03	0.78
Vancouver	0.119	0.39	0.15	0.14	0.64	0.49
Victoria Harbour	0.138	0.46	0.15	0.21	0.70	0.54

Table 7b: Summary of projected sea-level change and sea level allowances for RCP8.5 and years 1995-2099 at tide-gauge stations along **the Canadian Atlantic coast.** Sea-level rise projections are **corrected.**

Station Name	Scale Parameter (metres)	RCP8.5 Projection (metres)				Allowance (metres)
		Mean	Standard deviation	5% percentile	95% percentile	
Argentia	0.09	0.79	0.21	0.44	1.13	1.03
Cap-aux-Meules	0.114	0.75	0.36	0.16	1.34	1.32
Charlottetown	0.156	0.73	0.30	0.23	1.22	1.02
Halifax	0.101	0.80	0.25	0.38	1.21	1.11
Harrington Harbour	0.113	0.32	0.21	-0.03	0.67	0.52
Lauzon	0.19	0.36	0.33	-0.19	0.91	0.65
Lower Escuminac	0.149	0.71	0.36	0.11	1.31	1.15
Nain	0.108	-0.15	0.53	-1.03	0.72	1.15
North Sydney	0.117	0.82	0.28	0.36	1.28	1.15
Pictou	0.185	0.77	0.28	0.31	1.23	0.98
Pointe-au-Père	0.123	0.43	0.38	-0.20	1.06	1.03
Port aux Basques	0.08	0.73	0.28	0.27	1.18	1.21
Rimouski	0.102	0.43	0.38	-0.20	1.06	1.15
Rivière-au-Renard	0.106	0.61	0.39	-0.03	1.25	1.32
Saint John	0.109	0.66	0.27	0.21	1.11	1.00
Sainte-Anne-des-Monts	0.112	0.50	0.38	-0.13	1.13	1.16
Saint-François IO	0.185	0.37	0.34	-0.19	0.93	0.68
Saint-Joseph-de-la-Rive	0.159	0.37	0.35	-0.22	0.95	0.77
Sept-Îles	0.134	0.30	0.36	-0.30	0.89	0.78
Shediac Bay	0.225	0.69	0.31	0.18	1.20	0.90
St John's	0.081	0.81	0.22	0.44	1.17	1.11
Yarmouth	0.101	0.71	0.24	0.31	1.11	1.01

Table 7c: Summary of projected sea-level change and sea level allowances for RCP8.5 and years 1995-2099 at tide-gauge stations along **the coast of the United States.** The stations are grouped according to the states of Alaska, Washington, Massachusetts and Maine. Sea-level rise projections are **corrected.**

Station Name	Scale Parameter (metres)	RCP8.5 Projection (metres)				Allowance (metres)
		Mean	Standard deviation	5% percentile	95% percentile	
Cordova	0.119	0.42	0.20	0.09	0.75	0.59
Ketchikan	0.142	0.38	0.19	0.07	0.68	0.50
Kodiak	0.109	0.59	0.21	0.25	0.94	0.79
Prudhoe Bay	0.188	0.70	0.28	0.24	1.17	0.92
Seldovia	0.144	0.51	0.22	0.14	0.87	0.68
Seward	0.111	0.49	0.19	0.17	0.81	0.66
Sitka	0.112	0.47	0.18	0.18	0.76	0.61
Valdez	0.121	0.41	0.20	0.08	0.75	0.59
Yakutat	0.138	0.39	0.21	0.05	0.73	0.55
Cherry Point	0.145	0.41	0.15	0.17	0.66	0.49
Friday Harbour	0.135	0.44	0.15	0.20	0.69	0.53
Neah Bay	0.131	0.51	0.17	0.23	0.79	0.62
Port Angeles	0.130	0.48	0.16	0.23	0.74	0.57
Port Townsend	0.142	0.47	0.16	0.22	0.73	0.56
Toke Point	0.189	0.59	0.17	0.31	0.87	0.67
Boston	0.136	0.73	0.29	0.25	1.22	1.05
Eastport	0.083	0.62	0.27	0.18	1.07	1.07
Portland	0.107	0.63	0.29	0.15	1.11	1.03

Table 8a: Summary of projected sea-level change and sea level allowances for RCP8.5 and years 1995-2099 at tide-gauge stations along **the Canadian Pacific and Arctic coasts.** Sea-level rise projections are **not corrected.**

Station Name	Scale Parameter (metres)	RCP8.5 Projection (metres)				Allowance (metres)
		Mean	Standard deviation	5% percentile	95% percentile	
Alert Bay	0.129	0.42	0.15	0.18	0.66	0.50
Bamfield	0.129	0.54	0.18	0.24	0.84	0.67
Bella Bella	0.134	0.35	0.17	0.06	0.63	0.46
Campbell River	0.145	0.51	0.18	0.21	0.81	0.63
Churchill	0.166	-0.99	0.61	-2.00	0.02	0.14
Fulford Harbour	0.141	0.54	0.16	0.27	0.80	0.63
New Westminster	0.152	0.54	0.16	0.27	0.80	0.62
Patricia Bay	0.126	0.54	0.16	0.28	0.80	0.64
Point Atkinson	0.122	0.54	0.17	0.27	0.81	0.65
Port Hardy	0.101	0.39	0.14	0.16	0.61	0.48
Prince Rupert	0.153	0.30	0.15	0.05	0.54	0.37
Queen Charlotte City	0.140	0.52	0.19	0.21	0.83	0.65
Tofino	0.137	0.53	0.18	0.23	0.83	0.65
Tuktoyaktuk	0.242	0.74	0.20	0.41	1.08	0.83
Vancouver	0.119	0.54	0.16	0.27	0.81	0.65
Victoria Harbour	0.138	0.54	0.16	0.28	0.80	0.63

Table 8b: Summary of projected sea-level change and sea level allowances for RCP8.5 and years 1995-2099 at tide-gauge stations along **the Canadian Atlantic coasts.** Sea-level rise projections are **not corrected.**

Station Name	Scale Parameter (metres)	RCP8.5 Projection (metres)				Allowance (metres)
		Mean	Standard deviation	5% percentile	95% percentile	
Argentia	0.09	0.80	0.21	0.45	1.14	1.04
Cap-aux-Meules	0.114	0.75	0.36	0.16	1.34	1.32
Charlottetown	0.156	0.73	0.30	0.23	1.23	1.02
Halifax	0.101	0.80	0.25	0.39	1.22	1.12
Harrington Harbour	0.113	0.42	0.23	0.03	0.80	0.66
Lauzon	0.19	0.51	0.38	-0.12	1.13	0.89
Lower Escuminac	0.149	0.73	0.38	0.10	1.36	1.22
Nain	0.108	0.09	0.50	-0.73	0.92	1.26
North Sydney	0.117	0.82	0.28	0.36	1.28	1.15
Pictou	0.185	0.78	0.28	0.31	1.24	0.99
Pointe-au-Père	0.123	0.51	0.38	-0.12	1.13	1.09
Port aux Basques	0.08	0.73	0.28	0.27	1.19	1.21
Rimouski	0.102	0.51	0.38	-0.12	1.13	1.22
Rivière-au-Renard	0.106	0.61	0.39	-0.03	1.25	1.32
Saint John	0.109	0.65	0.26	0.23	1.07	0.95
Sainte-Anne-des-Monts	0.112	0.51	0.38	-0.12	1.13	1.15
Saint-François IO	0.185	0.51	0.38	-0.12	1.13	0.90
Saint-Joseph-de-la-Rive	0.159	0.51	0.38	-0.12	1.13	0.96
Sept-Îles	0.134	0.51	0.38	-0.11	1.13	1.05
Shediac Bay	0.225	0.72	0.33	0.17	1.27	0.97
St John's	0.081	0.81	0.22	0.45	1.18	1.12
Yarmouth	0.101	0.72	0.24	0.31	1.12	1.01

Table 8c: Summary of projected sea-level change and sea level allowances for RCP8.5 and years 1995-2099 at tide-gauge stations along **the coast of the United States.** The stations are grouped according to the states of Alaska, Washington, Massachusetts and Maine. Sea-level rise projections are **not corrected.**

Station Name	Scale Parameter (metres)	RCP8.5 Projection (metres)				Allowance (metres)
		Mean	Standard deviation	5% percentile	95% percentile	
Cordova	0.119	0.42	0.20	0.09	0.75	0.59
Ketchikan	0.142	0.40	0.19	0.09	0.72	0.53
Kodiak	0.109	0.59	0.21	0.25	0.94	0.79
Prudhoe Bay	0.188	0.71	0.28	0.24	1.17	0.92
Seldovia	0.144	0.51	0.22	0.14	0.87	0.68
Seward	0.111	0.51	0.19	0.19	0.82	0.68
Sitka	0.112	0.50	0.18	0.21	0.79	0.64
Valdez	0.121	0.42	0.20	0.09	0.75	0.59
Yakutat	0.138	0.39	0.21	0.06	0.73	0.55
Cherry Point	0.145	0.54	0.16	0.28	0.80	0.63
Friday Harbour	0.135	0.54	0.16	0.28	0.80	0.63
Neah Bay	0.131	0.55	0.17	0.26	0.84	0.67
Port Angeles	0.130	0.55	0.16	0.29	0.81	0.64
Port Townsend	0.142	0.55	0.16	0.29	0.82	0.64
Toke Point	0.189	0.60	0.17	0.31	0.88	0.67
Boston	0.136	0.75	0.29	0.27	1.23	1.06
Eastport	0.083	0.63	0.26	0.20	1.06	1.05
Portland	0.107	0.69	0.29	0.22	1.16	1.07

Figures

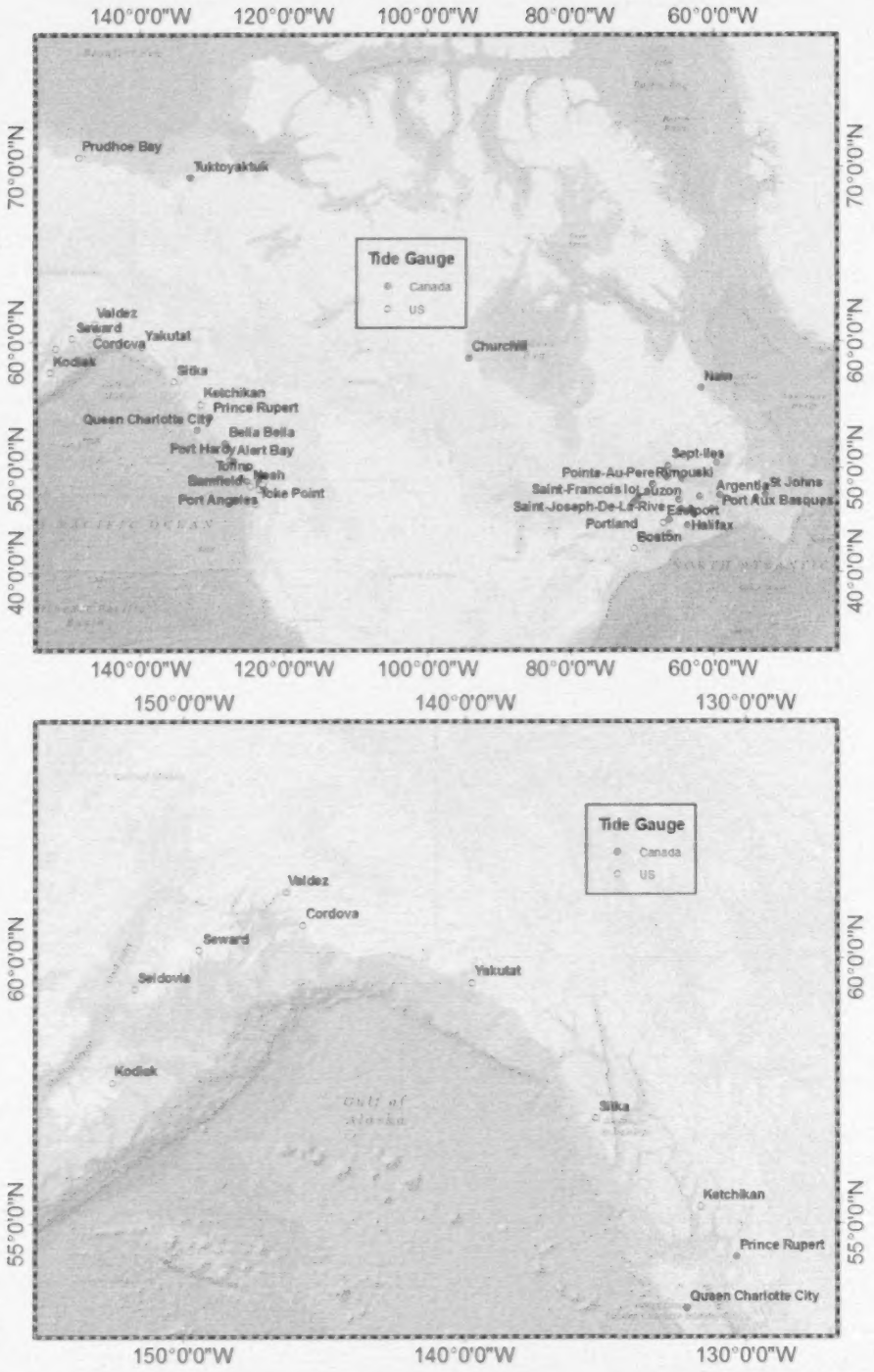

Figure 1a: (Top) Large-scale map showing tide gauge stations along the coasts of Canada and the adjacent United States, (bottom) Small-scale map showing tide gauge stations in Alaska.

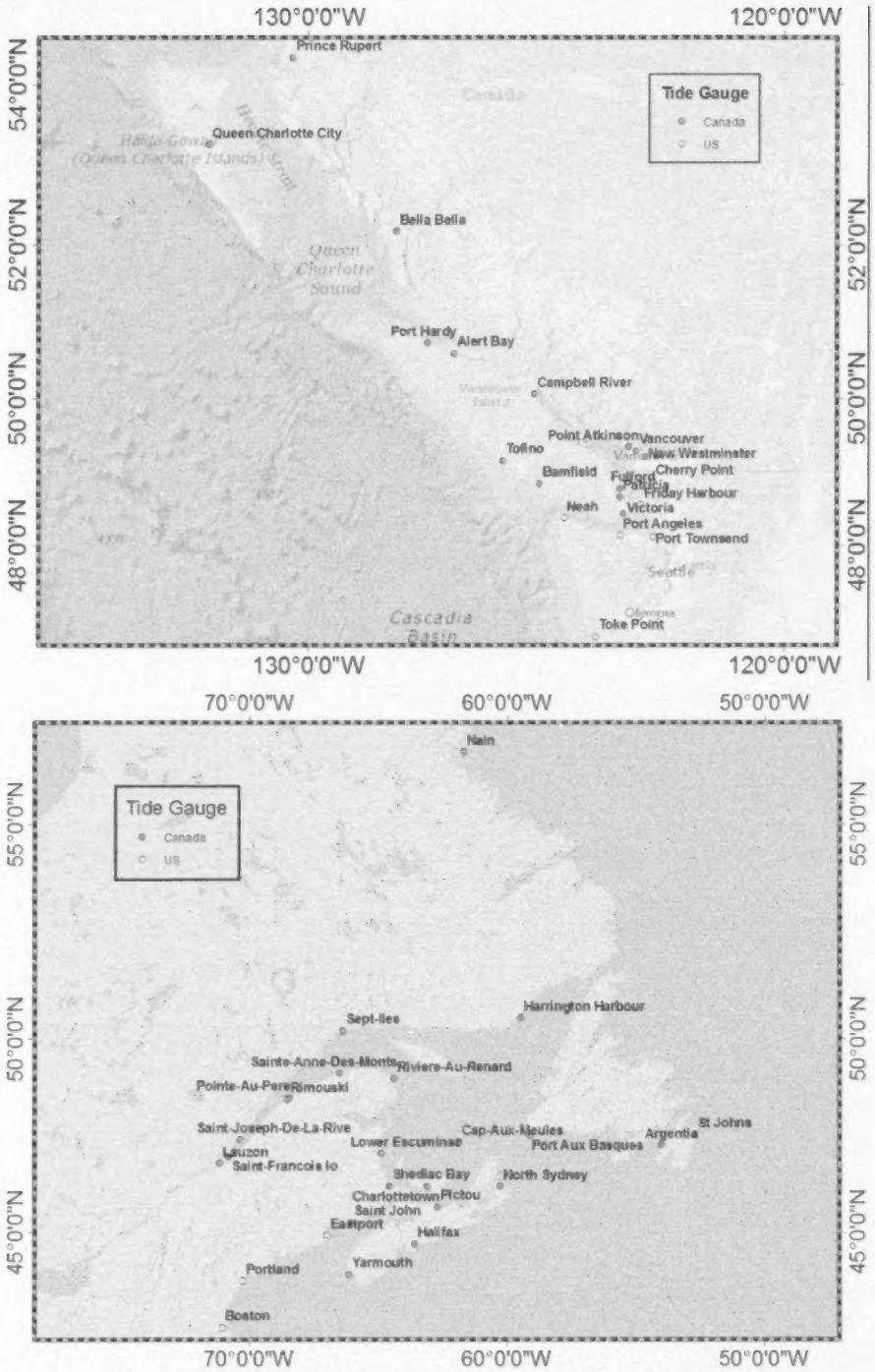

Figure 1b: Small-scale map showing tide gauge stations along (top) the Pacific coast, and (bottom) the Atlantic coast.

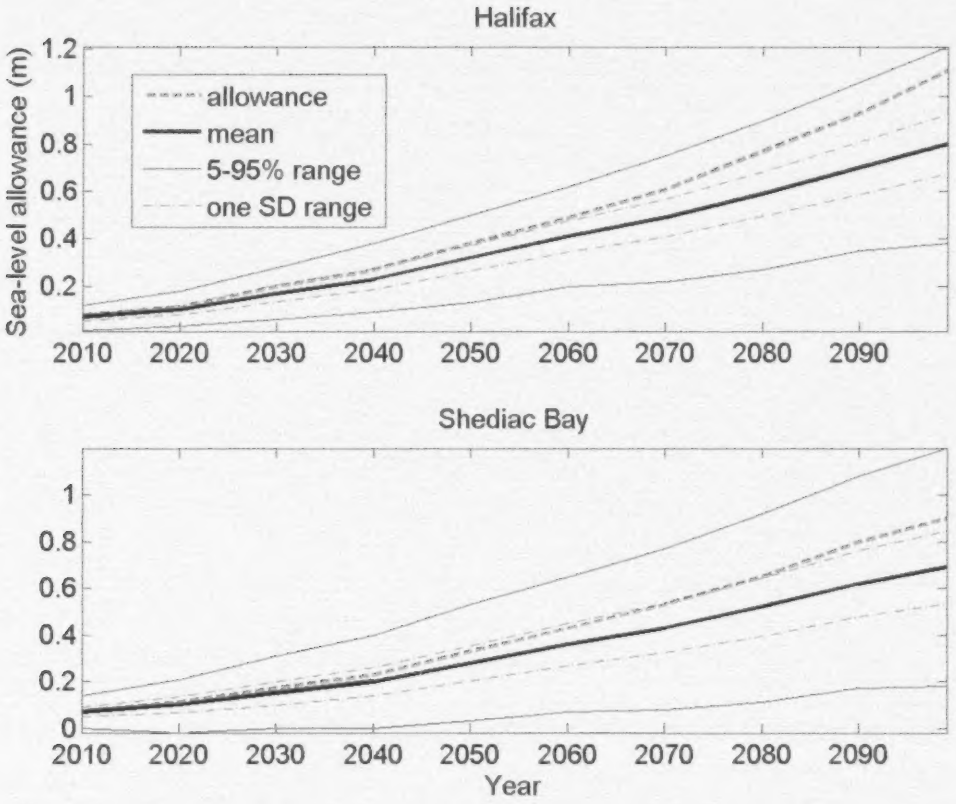

Figure 2: Time evolution of sea-level allowances and projections for RCP8.5 for (top) Halifax and (bottom) Shediac Bay. Thick red dashed line indicates sea-level allowances. Thick solid line, thin solid lines, and thin dash-dotted lines indicate the mean, the 5-95% percentile range, and the mean-0.5×SD to mean+0.5×SD range of relative sea-level projections for RCP8.5 respectively.

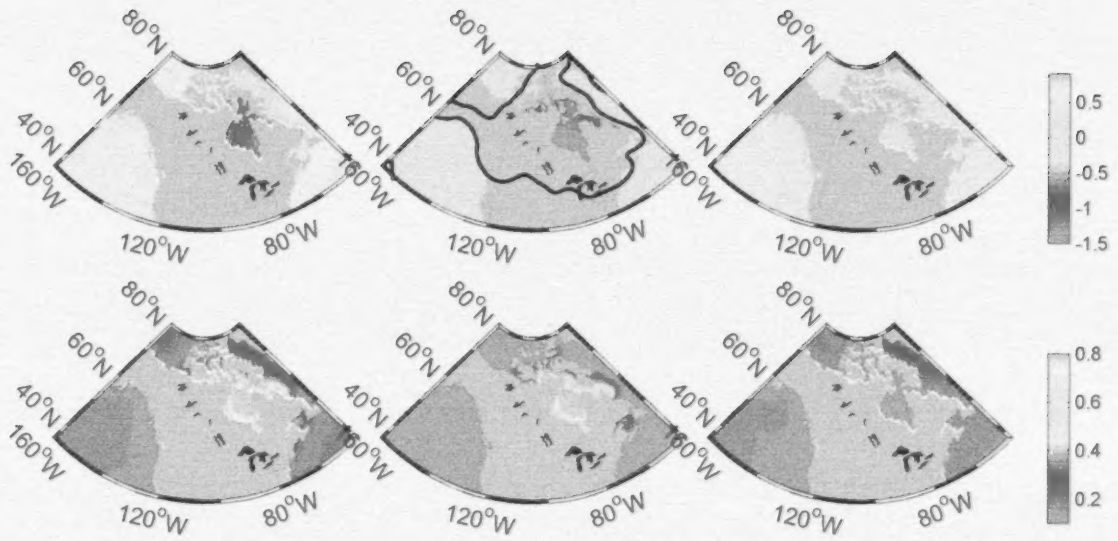

Figure 3a: (Top) Mean (in m), and (bottom) standard deviation (in m) of regional projections of sea-level rise between 1995-2099 from the AR5 RCP4.5 scenario. (Left column) Total regional projections. (Middle column) GIA contributions to the total projections. (Right column) Regional sea-level projections without GIA. The black zero contour line represents the hinge line between land uplift and subsidence.

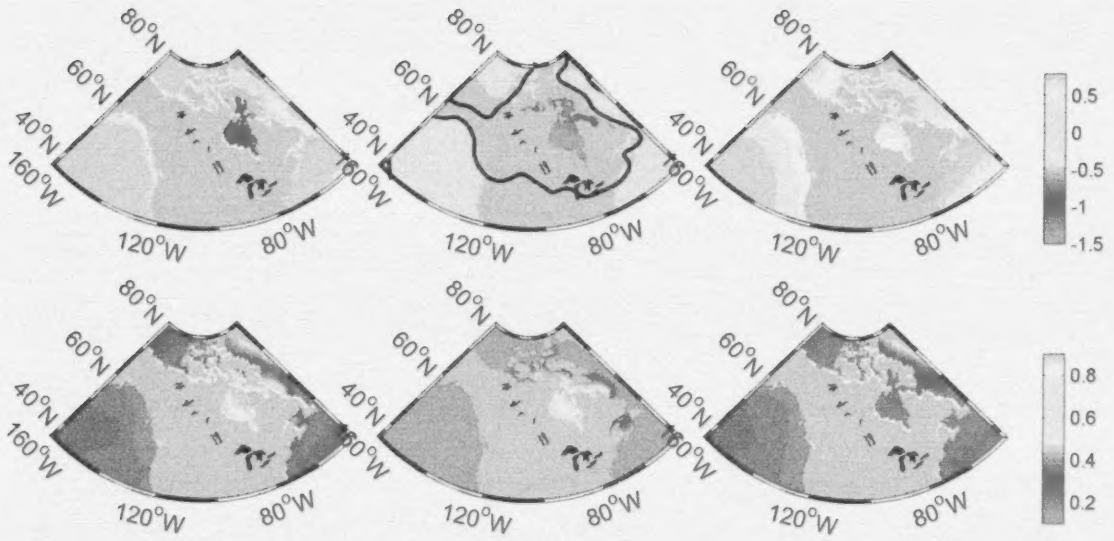

Figure 3b: (Top) Mean (in m), and (bottom) standard deviation (in m) of regional projections of sea-level rise between 1995-2099 from the AR5 RCP8.5 scenario. (Left column) Total regional projections. (Middle column) GIA contributions to the total projections. (Right column) Regional sea-level projections without GIA. The black zero contour line represents the hinge line between land uplift and subsidence.

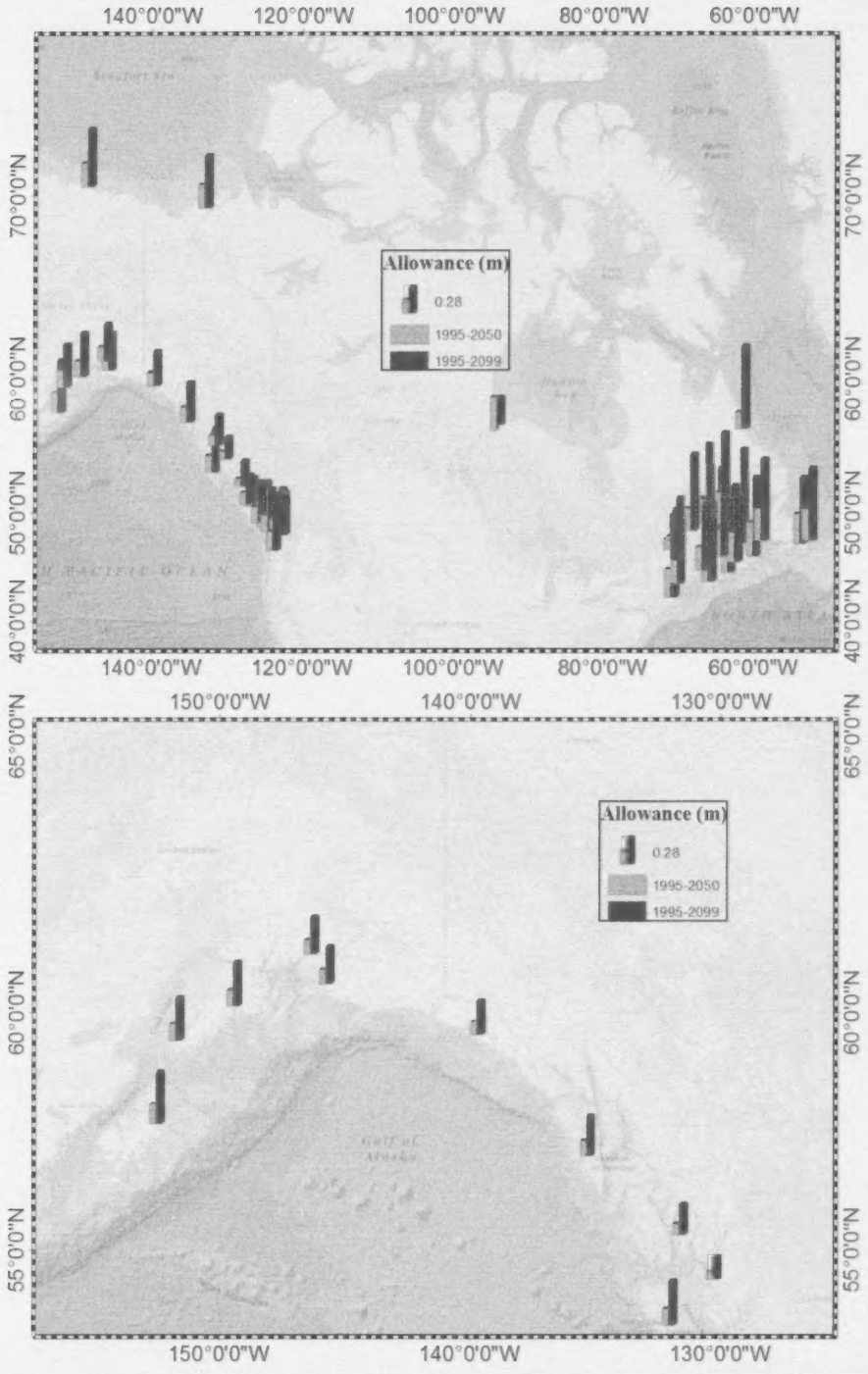

Figure 4a: (Top) Large-scale map of sea level allowances for RCP4.5 for tide gauge stations along the coasts of Canada and the adjacent United States, and (bottom) small-scale map of sea level allowances for RCP4.5 for tide gauge stations along the coast of Alaska. The allowances were derived using the corrected sea-level rise projections. The scale of the black sea level bar in the legend is 0.28 m.

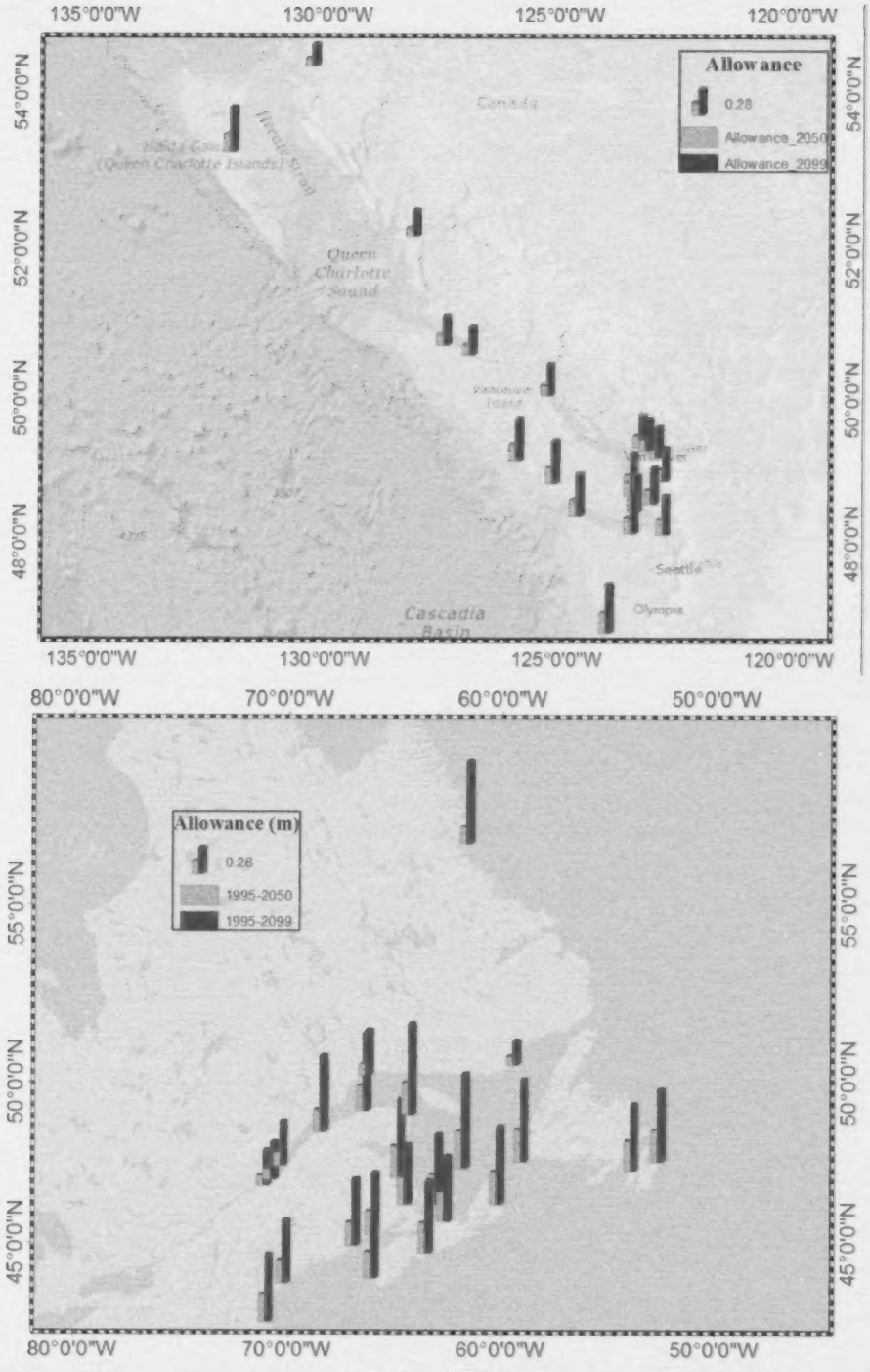

Figure 4b: Small-scale map of sea level allowances for RCP4.5 for tide gauge stations along (top) the Pacific coast, and (bottom) the Atlantic coast. The allowances were derived using the corrected sea-level rise projections. The scale of the black vertical bar in the legend is 0.28 m.

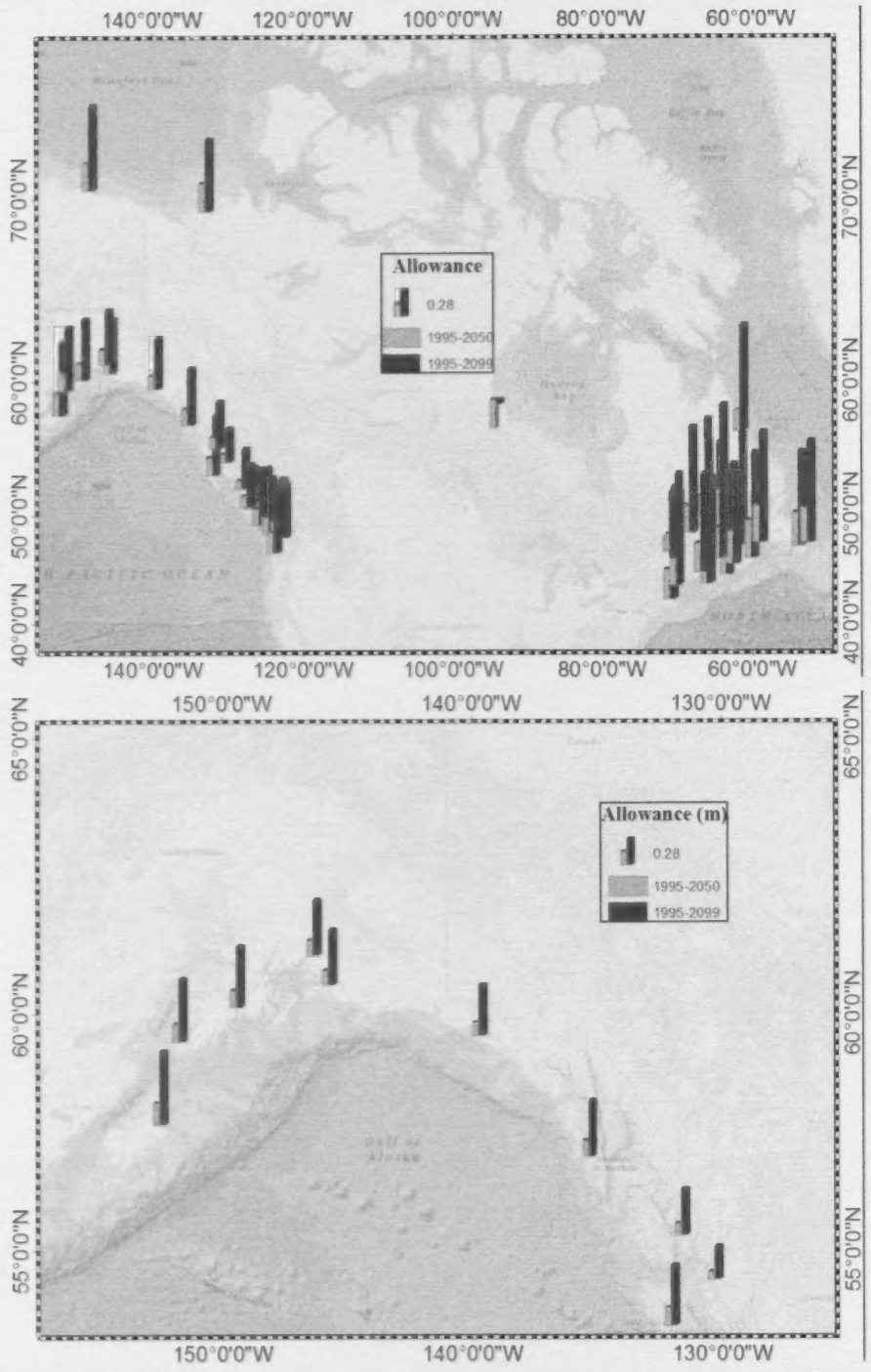

Figure 5a: (Top) Large-scale map of sea level allowances for RCP8.5 for tide gauge stations along the coasts of Canada and the adjacent United States, (bottom) small-scale map of sea level allowances for RCP8.5 for tide gauge stations along the coast of Alaska. The allowances were derived using the corrected sea-level rise projections. The scale of the black vertical bar in the legend is 0.28 m.

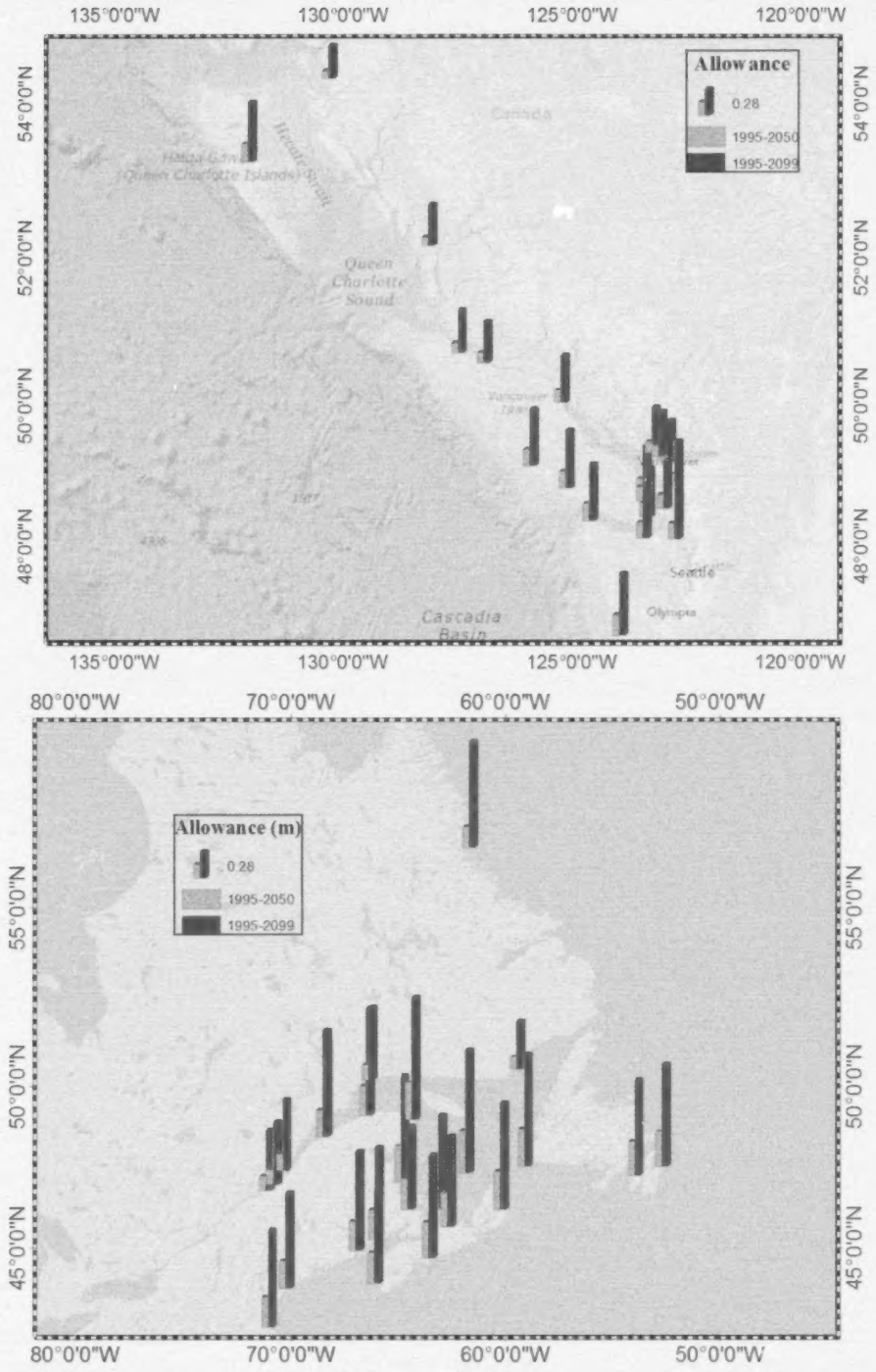

Figure 5b: Small-scale map of sea level allowances for RCP8.5 for tide gauge stations along (top) the Pacific coast, and (bottom) the Atlantic coast. The allowances were derived using the corrected sea-level rise projections. The scale of the black vertical bar in the legend is 0.28 m.

APPENDIX A1: Statistics of tides and storm surges for tide gauges along **the Canadian Pacific and Arctic coasts**. (Left) The return level plot and, (right) the exceedance probabilities. Solid lines are the maximum likelihood curves and dashed lines indicate the 95% confidence bounds. Dots are the ordered, observed detrended annual maxima.

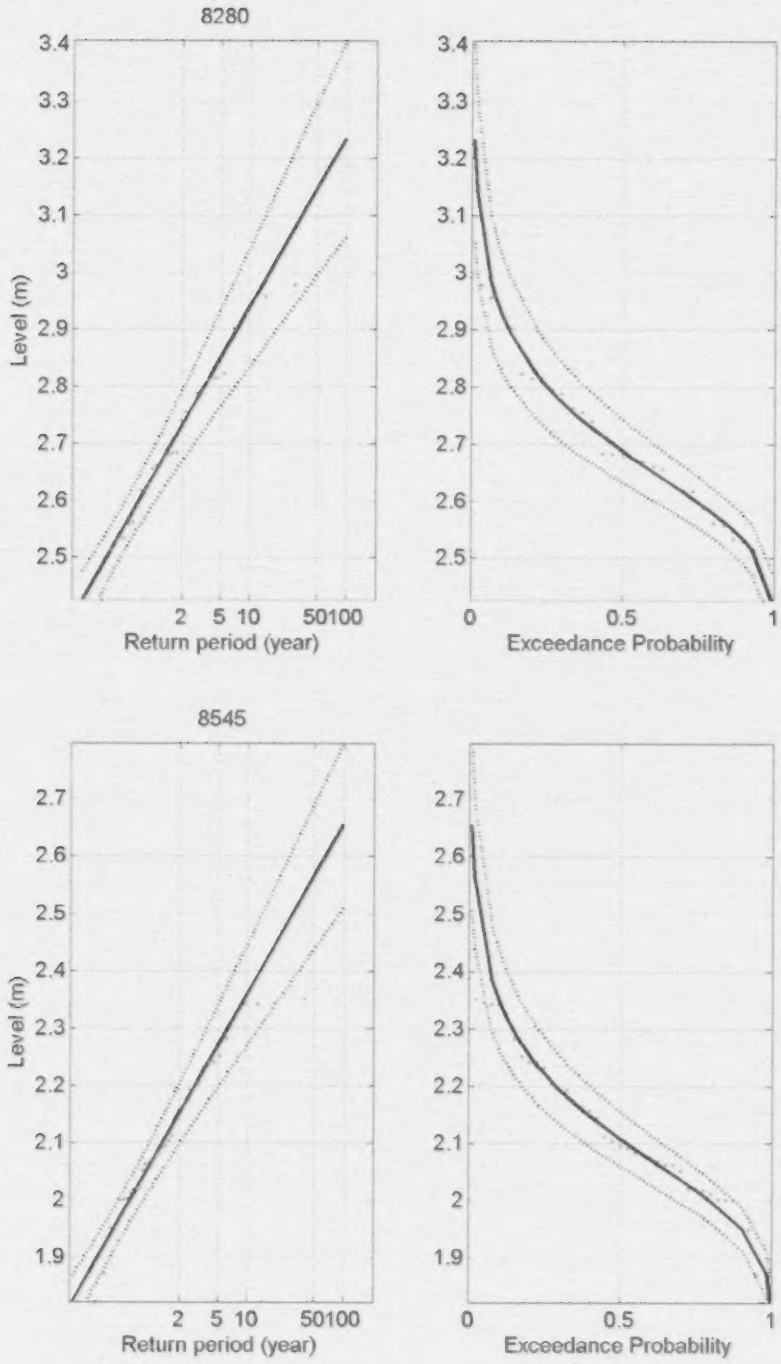

Figure 6: (Top) Alert Bay, British Columbia (tide gauge site 8280). (Bottom) Bamfield, British Columbia (tide gauge site 8545).

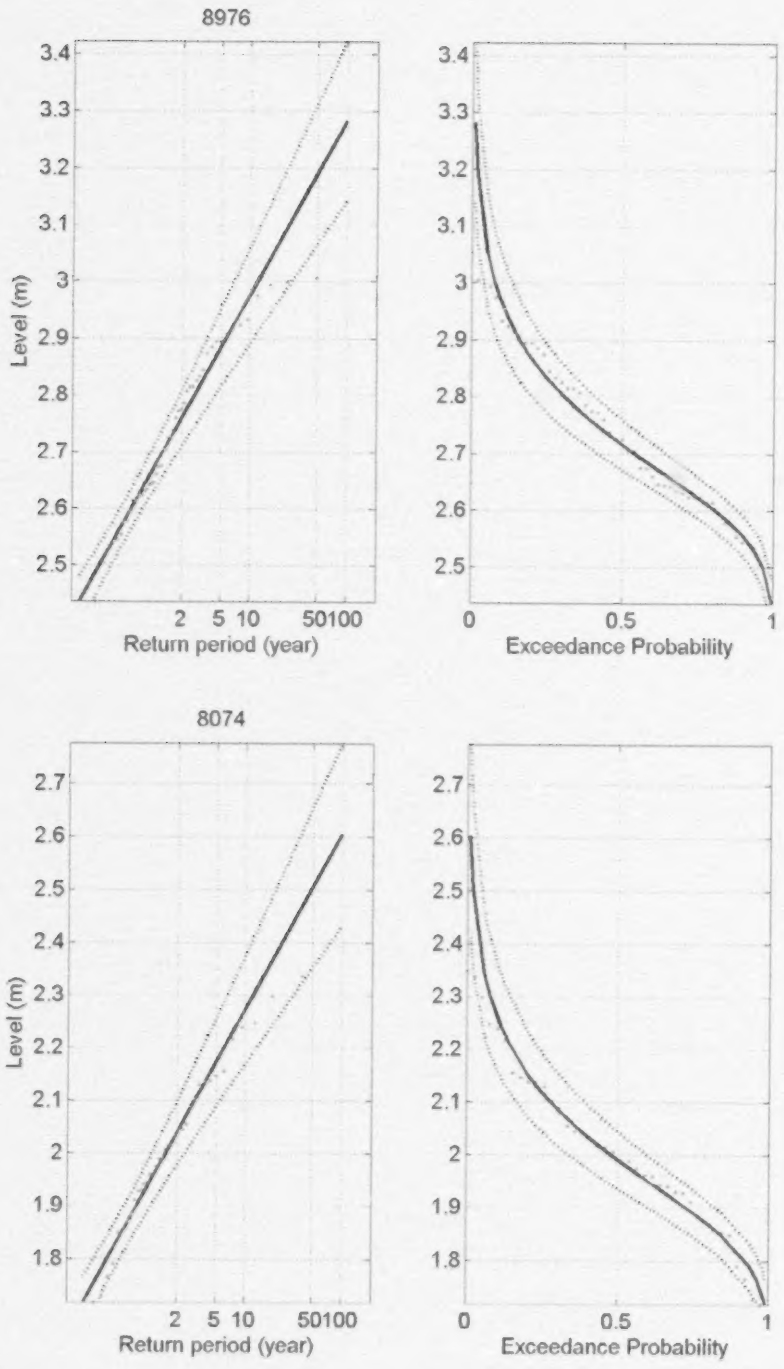

Figure 7: (Top) Bella Bella, British Columbia (tide gauge site 8976). (Bottom) Campbell River, British Columbia (tide gauge site 8074).

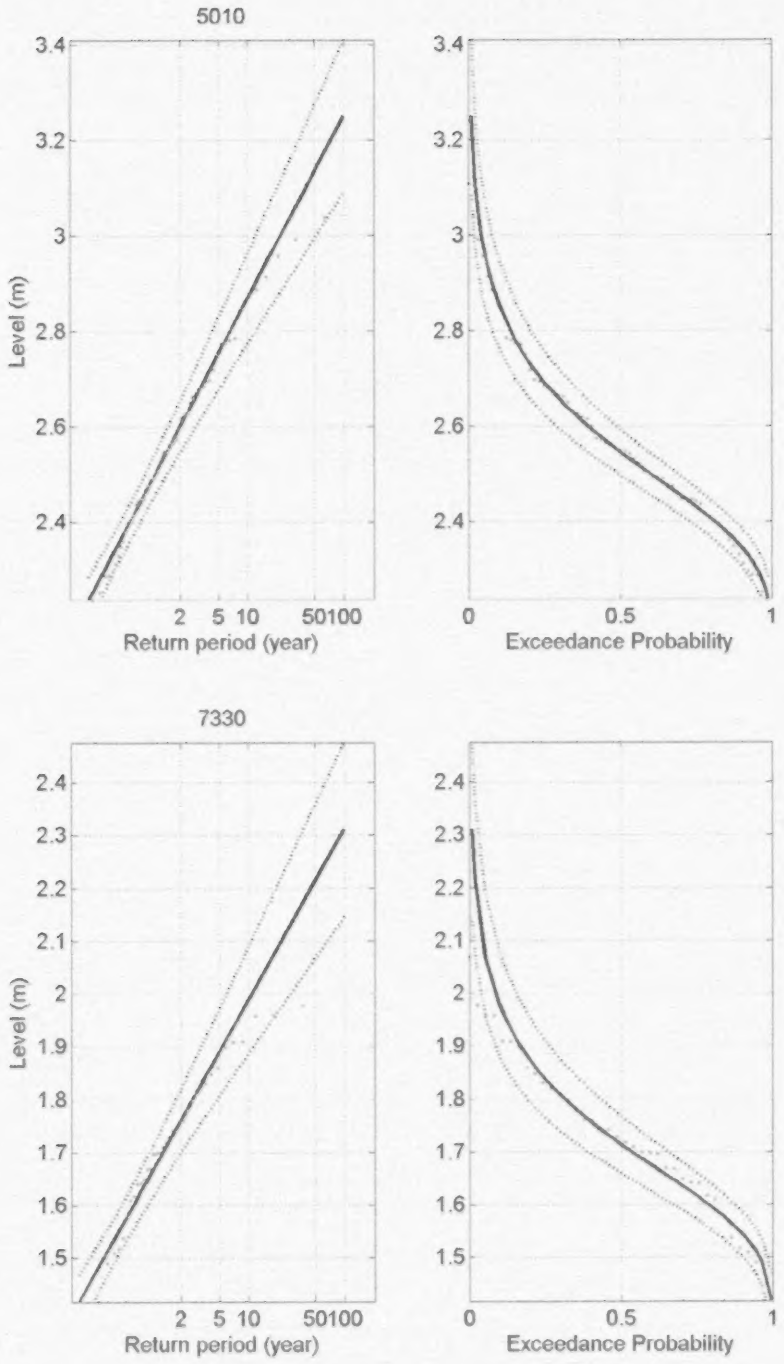

Figure 8: (Top) Churchill, Hudson Bay (tide gauge site 5010). (Bottom) Fulford Harbour, British Columbia (tide gauge site 7330).

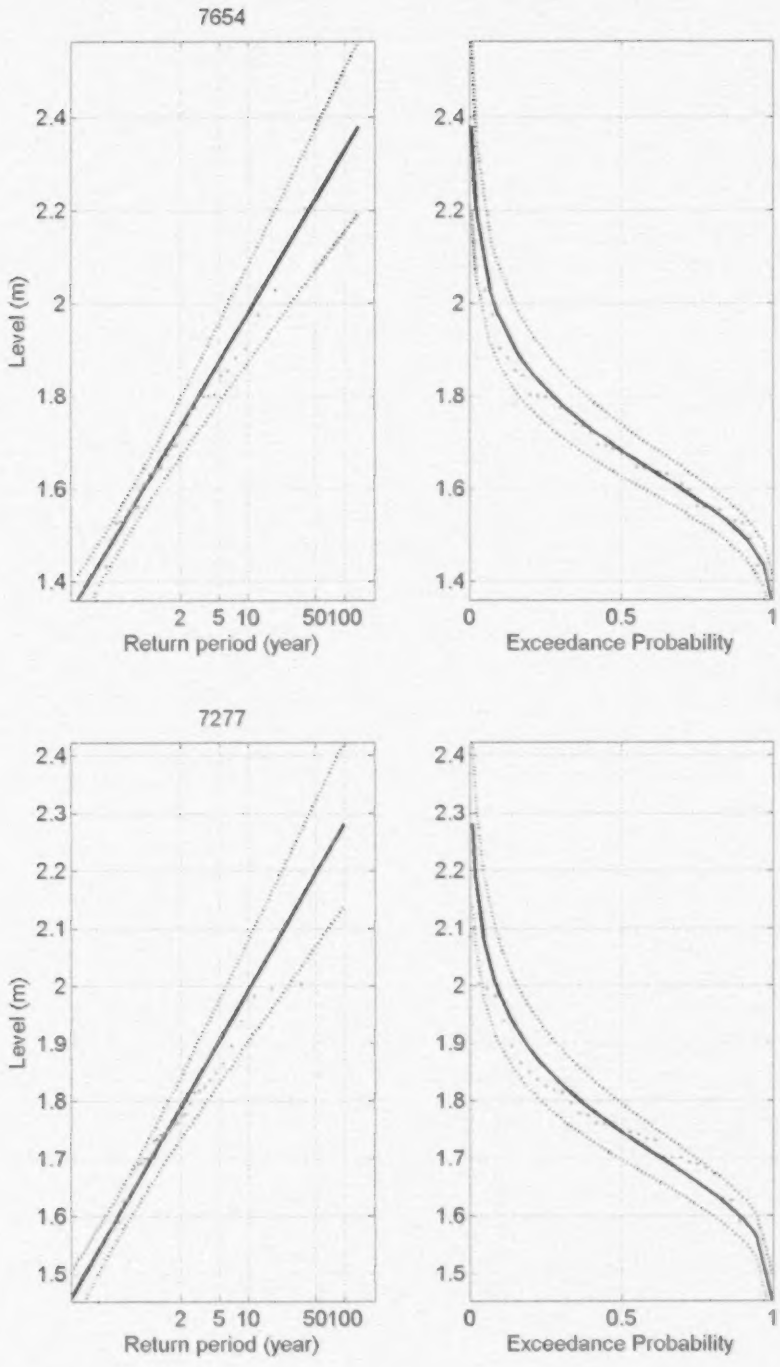

Figure 9: (Top) New Westminster, British Columbia (tide gauge site 7654). (Bottom) Patricia Bay, British Columbia (tide gauge site 7277).

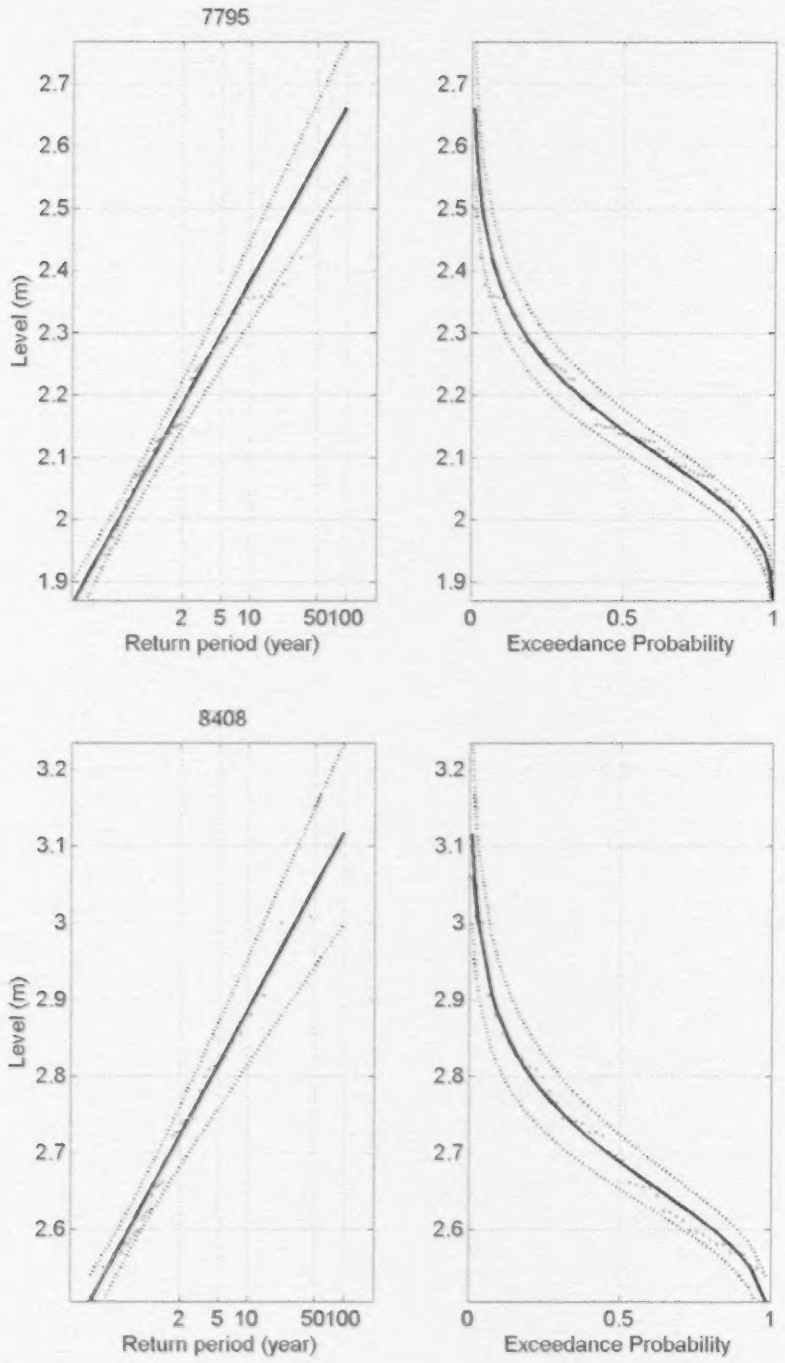

Figure 10: (Top) Point Atkinson, British Columbia (tide gauge site 7795). (Bottom) Port Hardy, British Columbia (tide gauge site 8408).

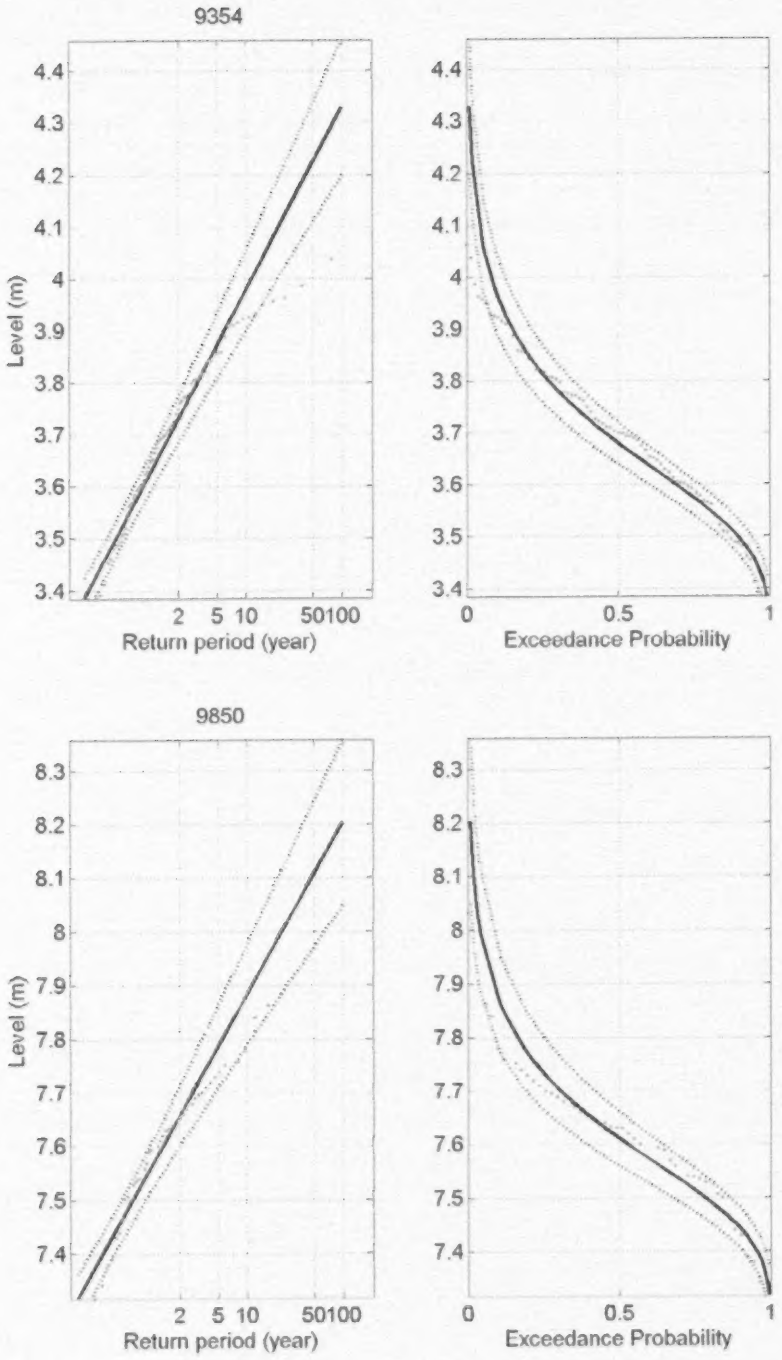

Figure 11: (Top) Prince Rupert, British Columbia (tide gauge site 9354). (Bottom) Queen Charlotte City, British Columbia (tide gauge site 9850).

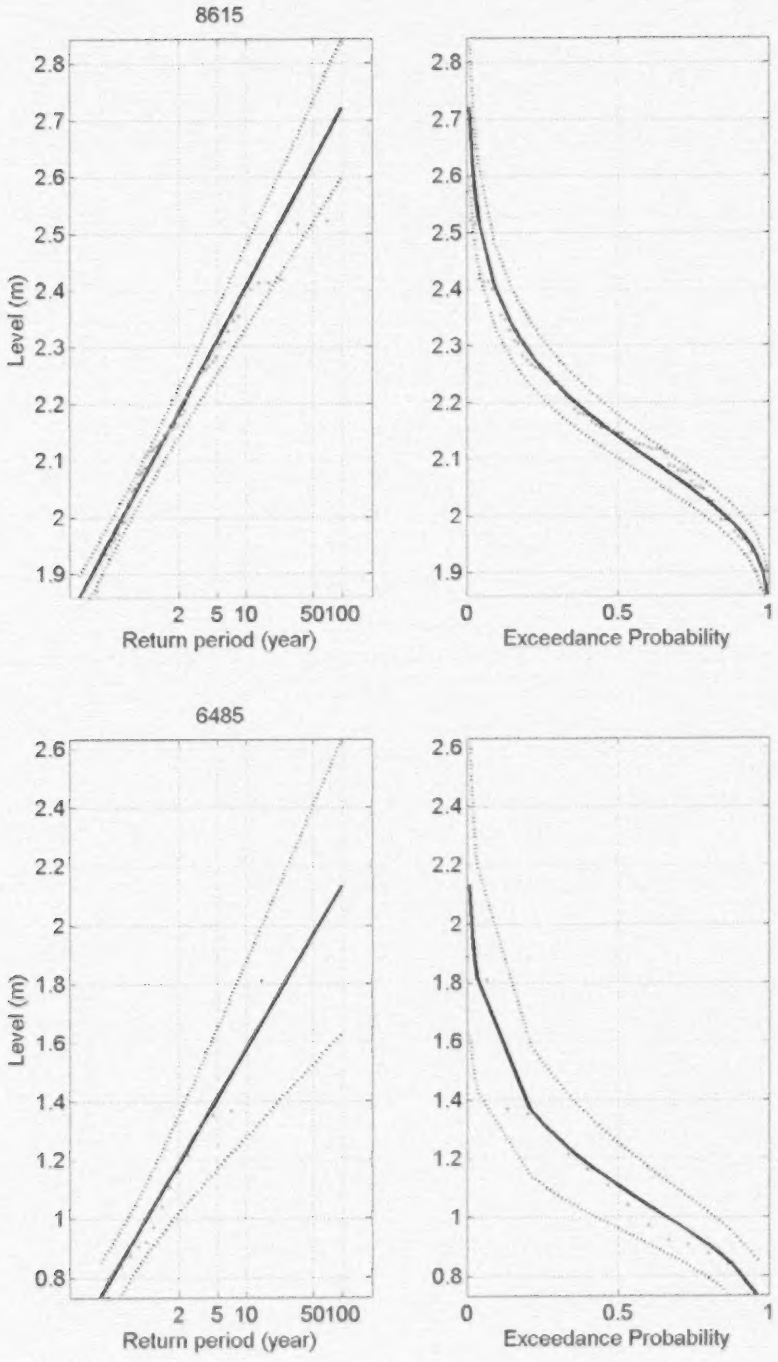

Figure 12: (Top) Tofino, British Columbia (tide gauge site 8615). (Bottom) Tuktoyaktuk, Nunavut (tide gauge site 6485).

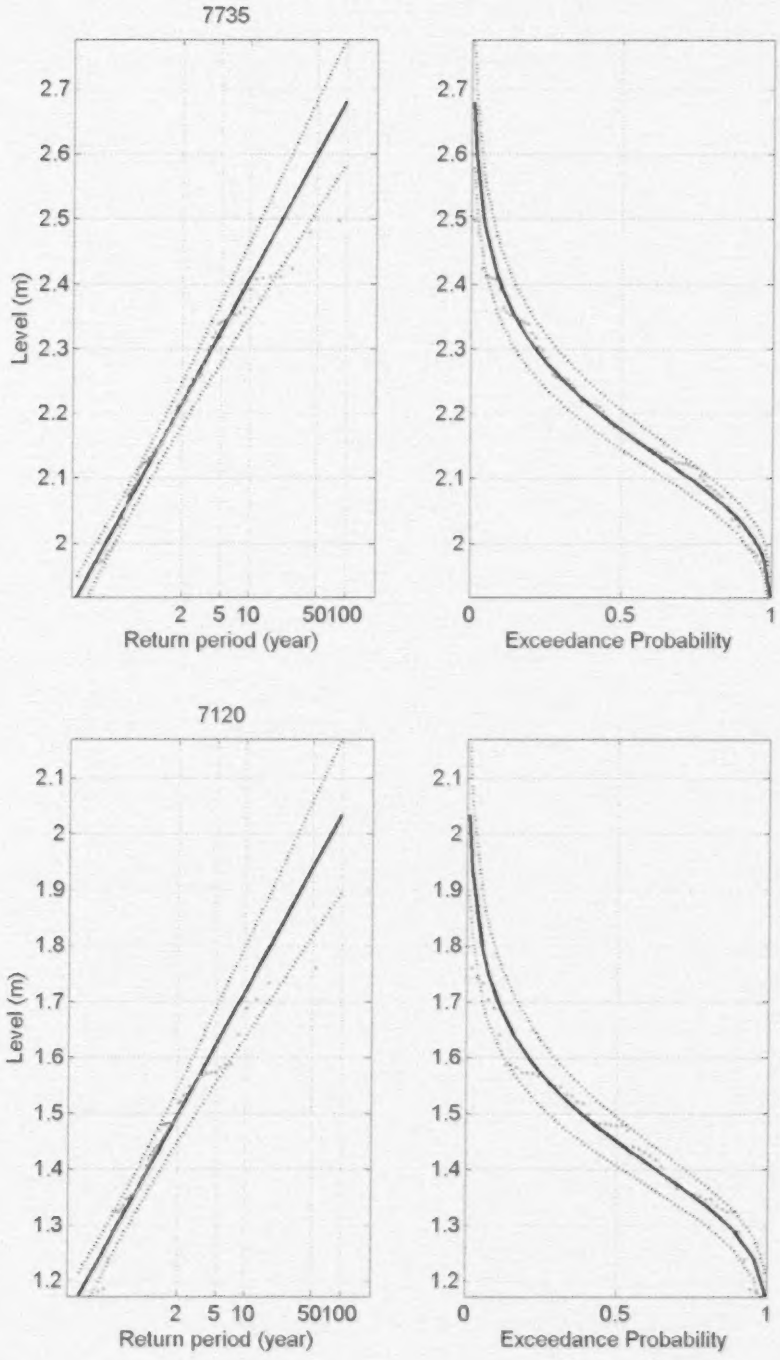

Figure 13: (Top) Vancouver, British Columbia (tide gauge site 7735). (Bottom) Victoria, British Columbia (tide gauge site 7120).

APPENDIX A2: Statistics of tides and storm surges for tide gauges along **the Canadian Atlantic coast.**

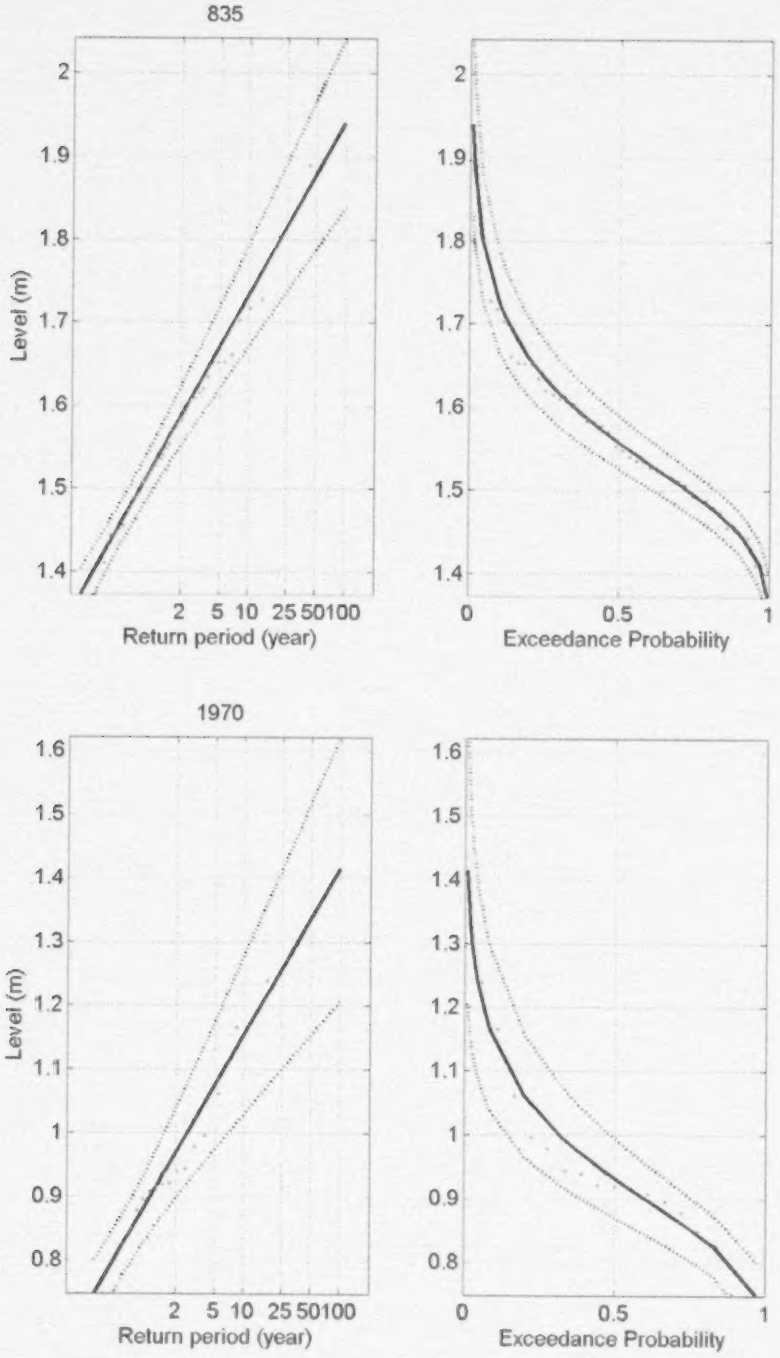

Figure 14: (Top) Argentia, Newfoundland (tide gauge site 835). (Bottom) Cap-aux-Meules, Québec (tide gauge site 1970).

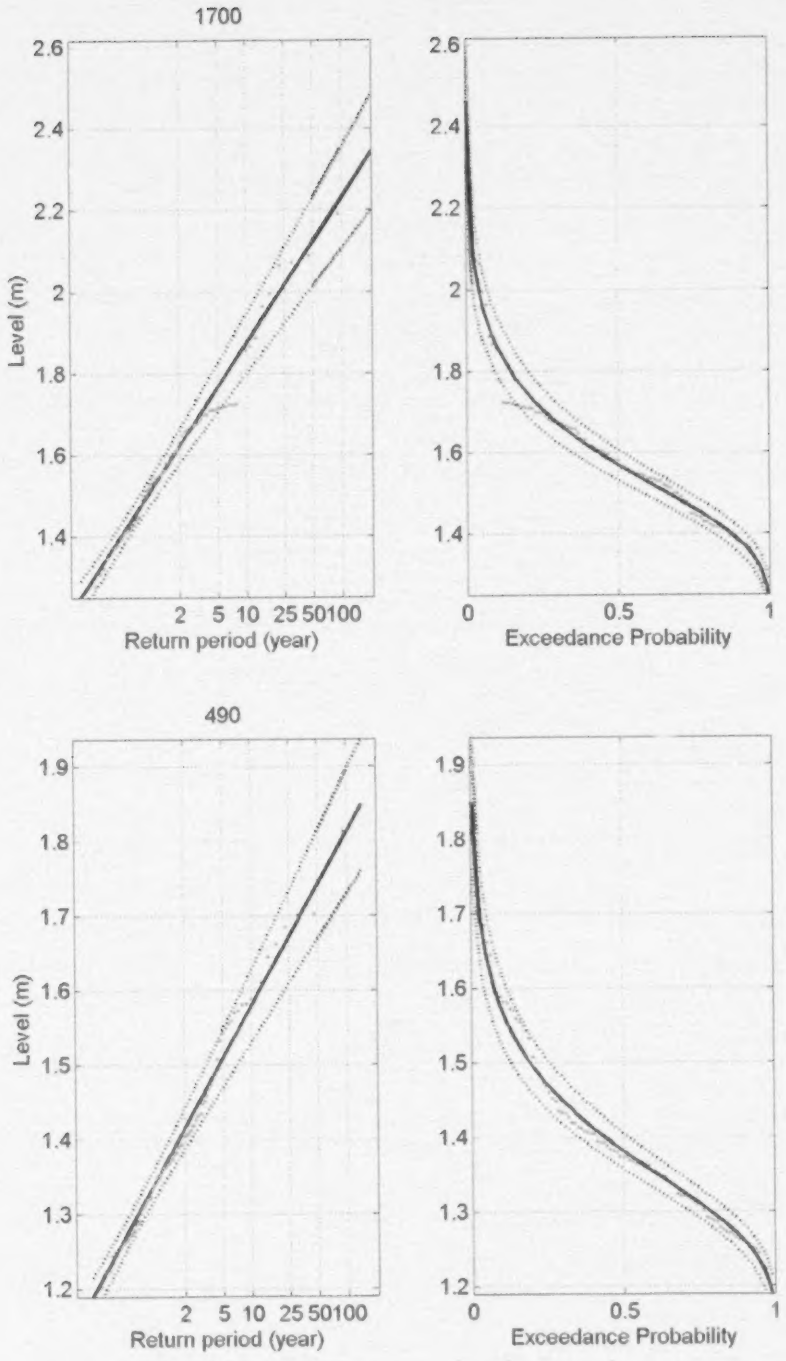

Figure 15: (Top) Charlottetwon, Prince Edward Island (tide gauge site 1700). (Bottom) Halifax, Nova Scotia (tide gauge site 490).

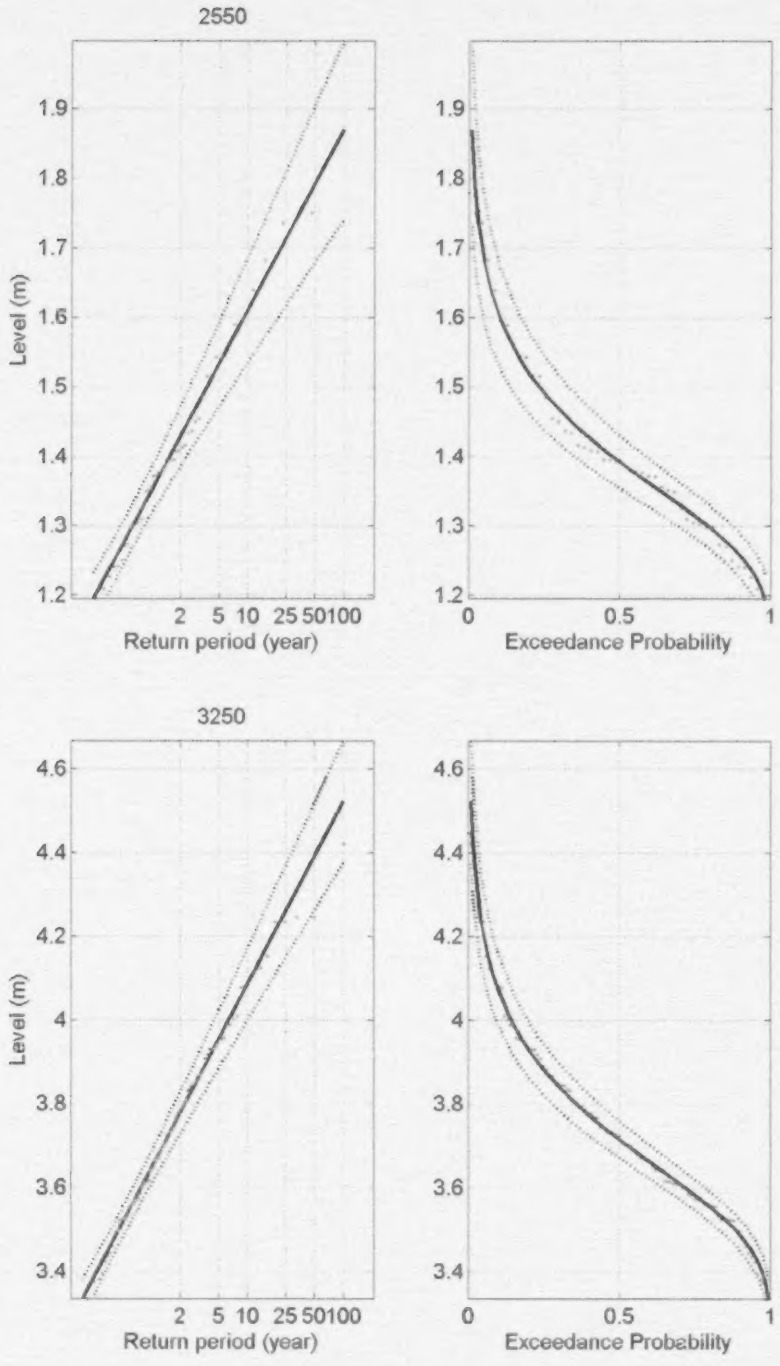

Figure 16: (Top) Harrington Harbour, Québec (tide gauge site 2550). (Bottom) Lauzon, Québec (tide gauge site 3250).

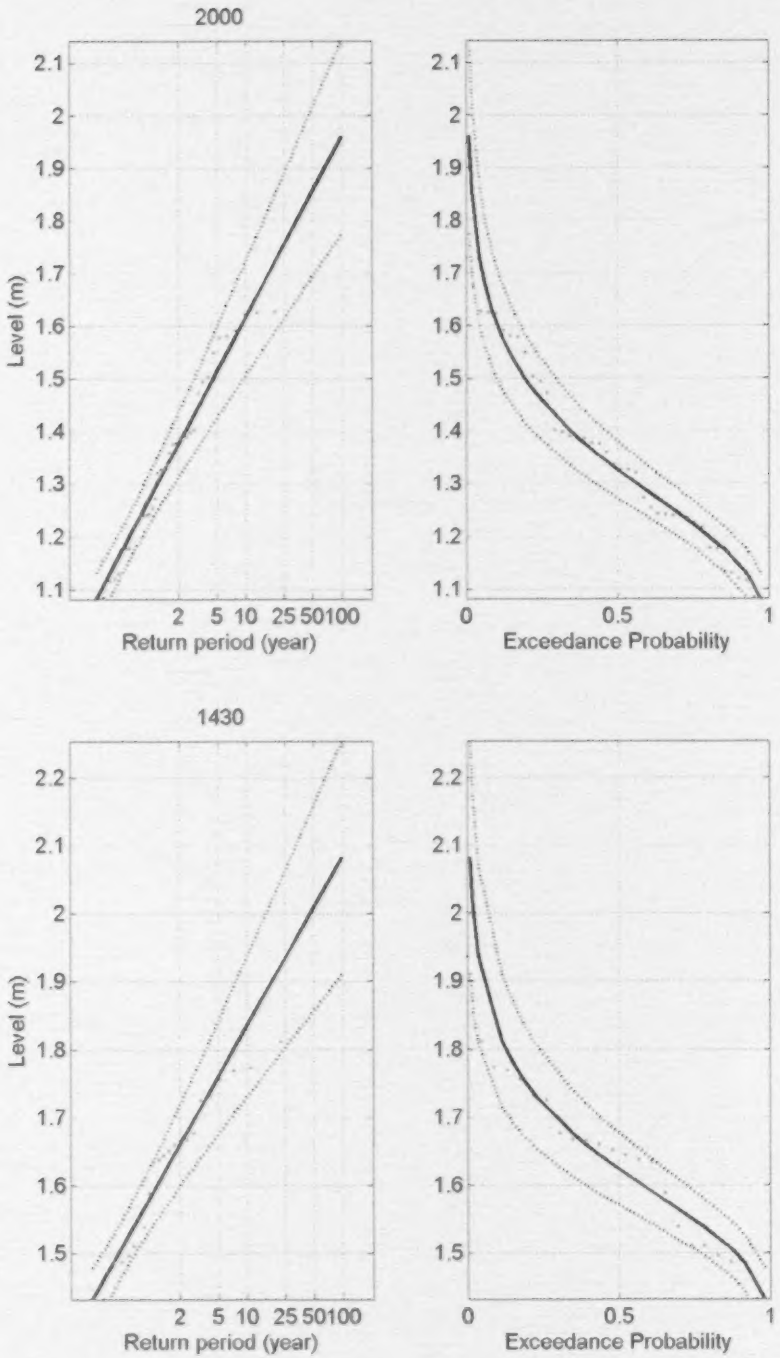

Figure 17: (Top) Lower Escuminac, New Brunswick (tide gauge site 2000). (Bottom) Nain, Newfoundland (tide gauge site 1430).

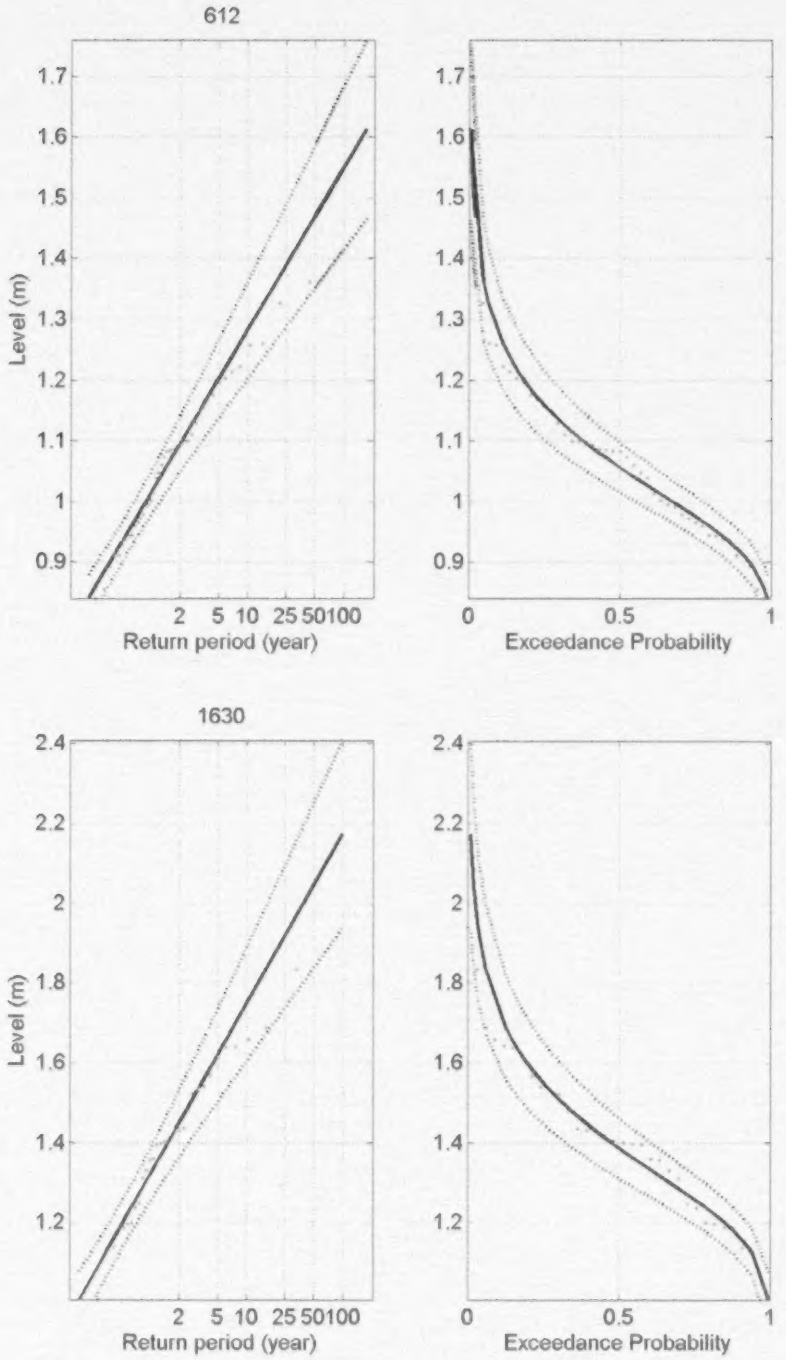

Figure 18: (Top) North Sydney, Nova Scotia (tide gauge site 612). (Bottom) Pictou, Nova Scotia (tide gauge site 1630).

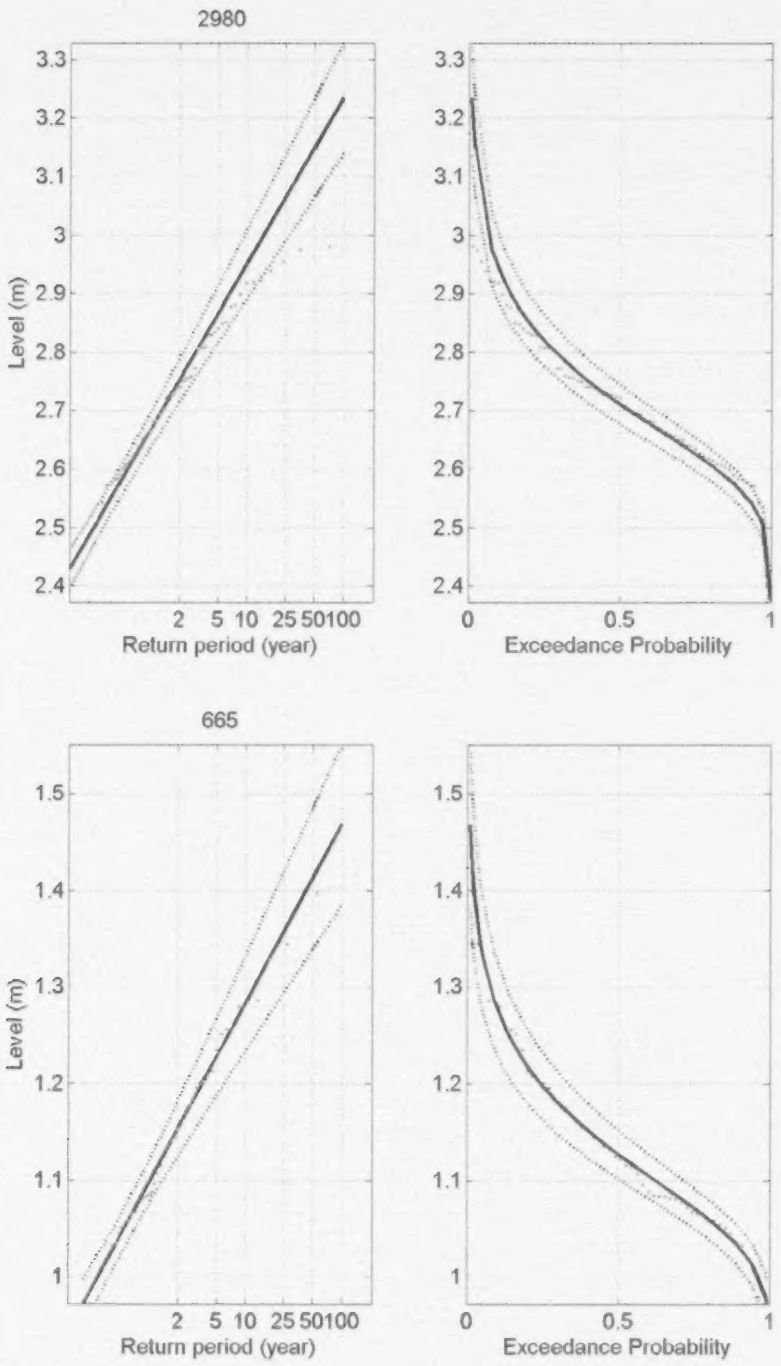

Figure 19: (Top) Pointe-au-Père, Québec (tide gauge site 2980). (Bottom) Port aux Basques, Newfoundland (tide gauge site 665).

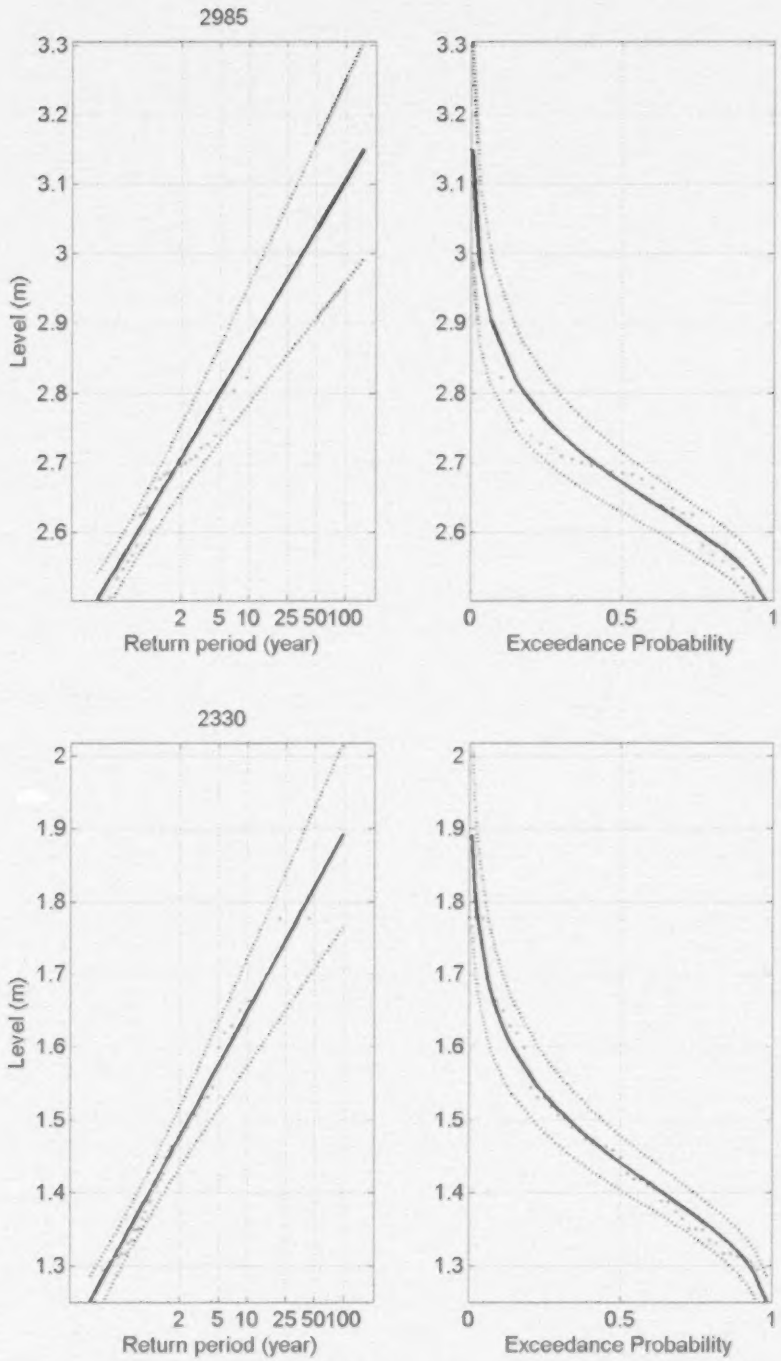

Figure 20: (Top) Rimouski, Québec (tide gauge site 2985). (Bottom) Rivière-au-Renard, Québec (tide gauge site 2330).

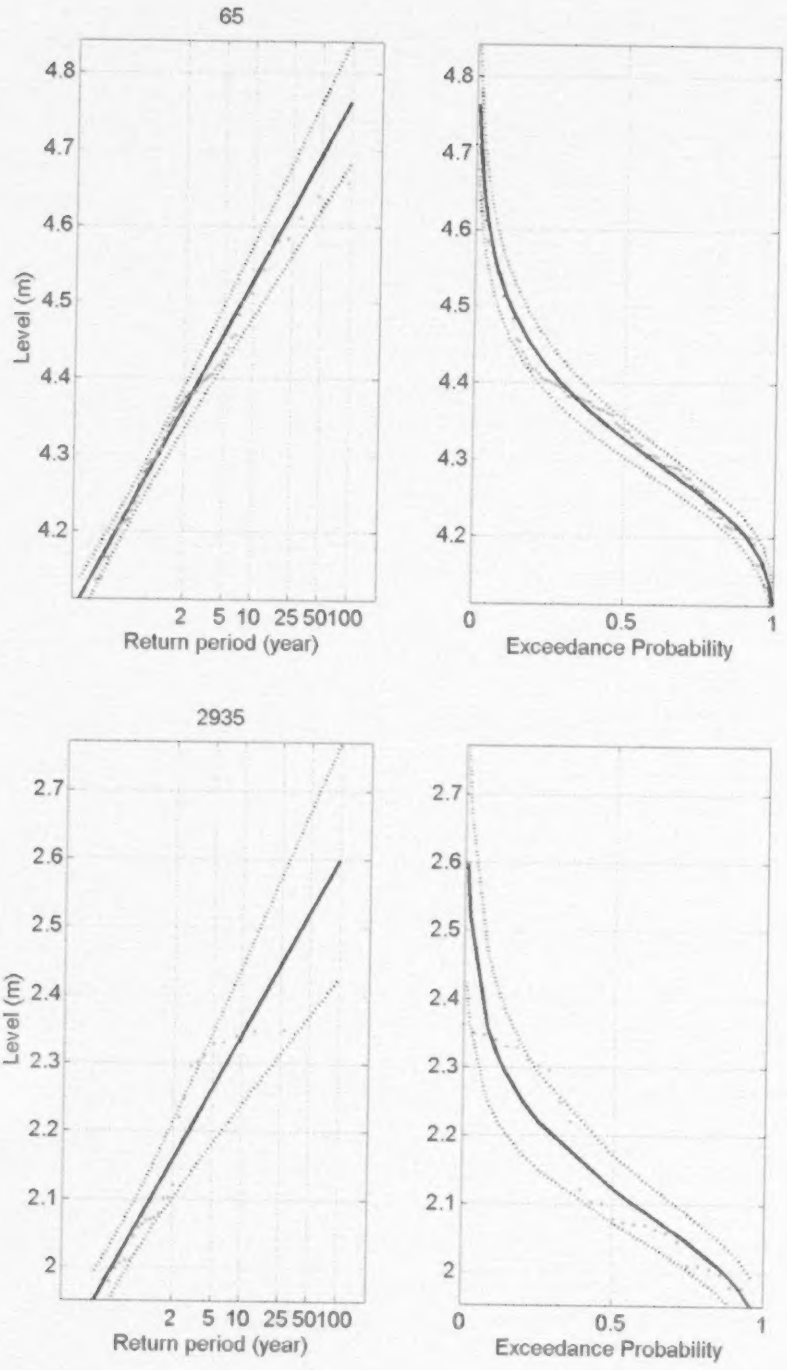

Figure 21: (Top) Saint John, New Brunswick (tide gauge site 65). (Bottom) Sainte-Anne-des-Monts, Québec (tide gauge site 2935).

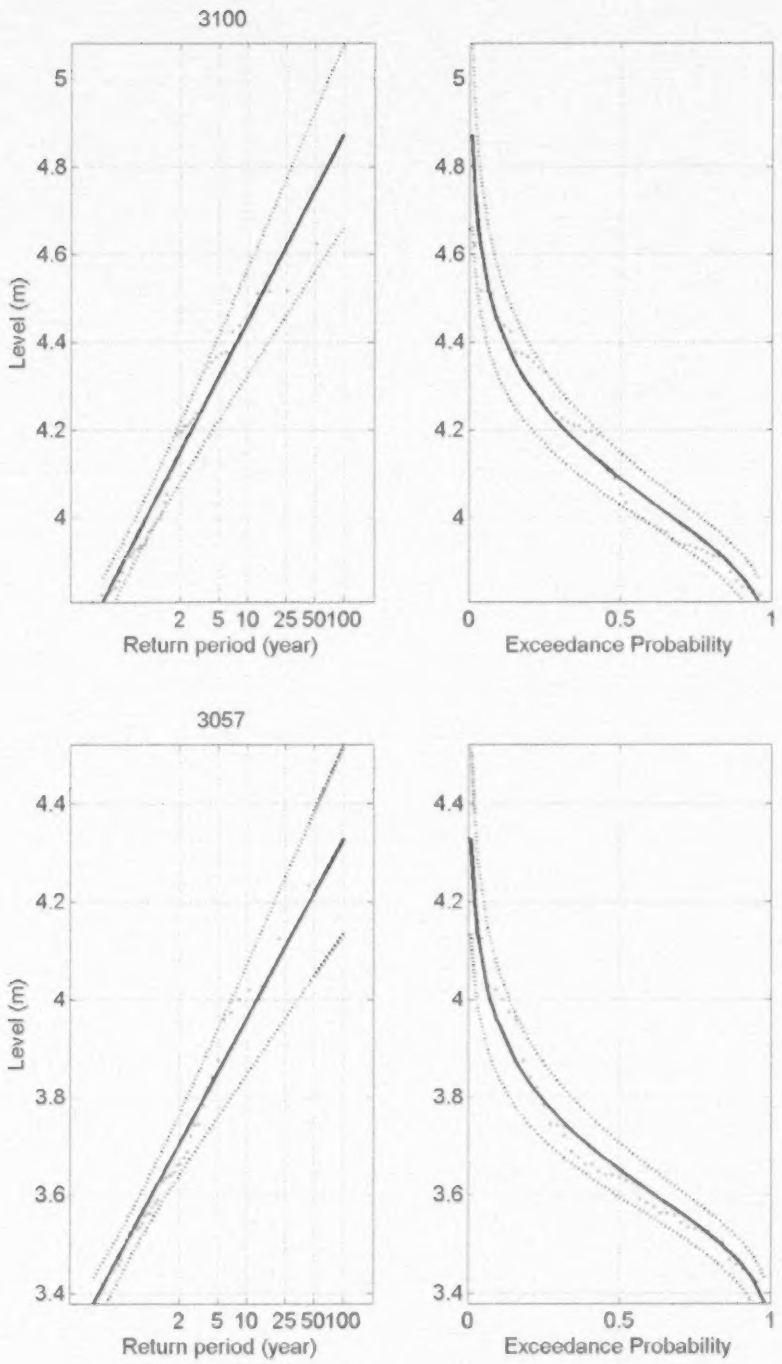

Figure 22: (Top) Saint-François IO, Québec (tide gauge site 3100). (Bottom) Saint-Joseph-de-la-Rive, Québec (tide gauge site 3057).

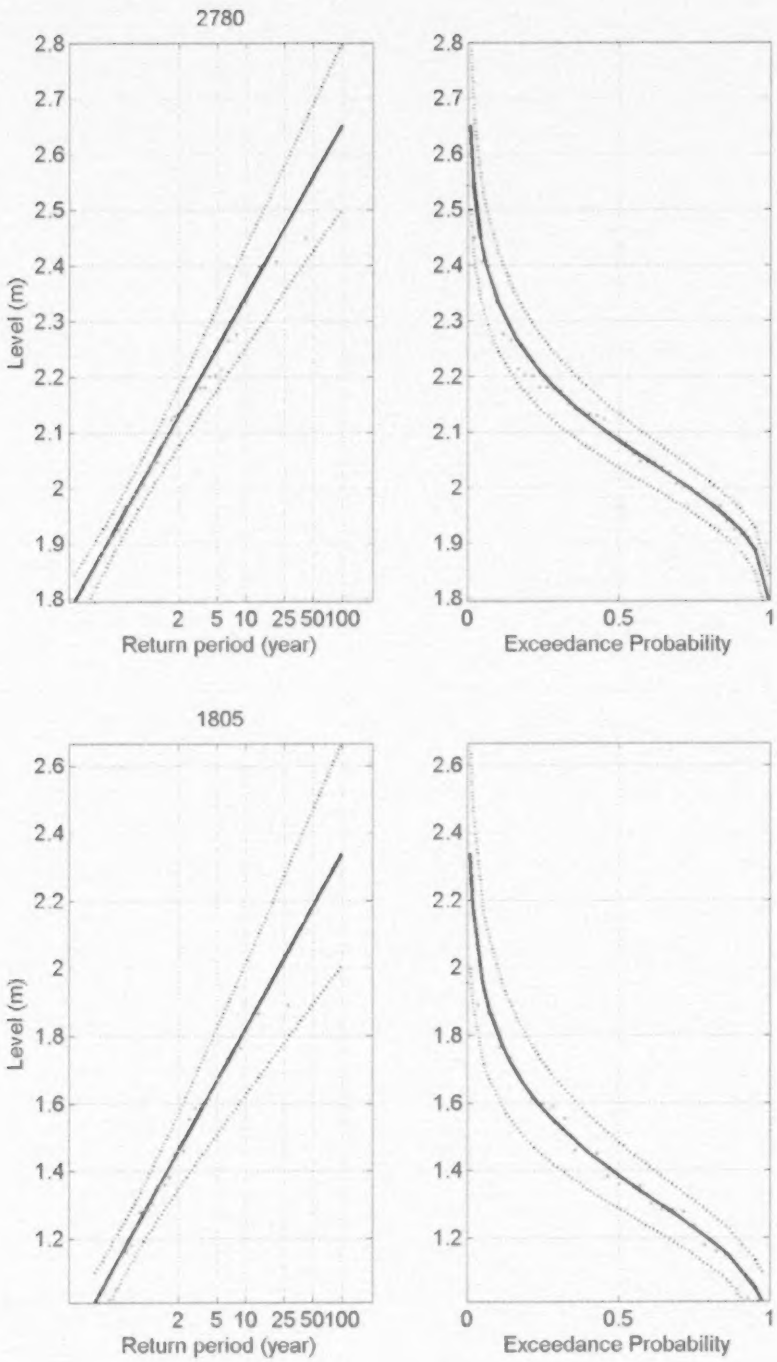

Figure 23: (Top) Sept-Îles, Québec (tide gauge site 2780). (Bottom) Shediac Bay, New Brunswick (tide gauge site 1805).

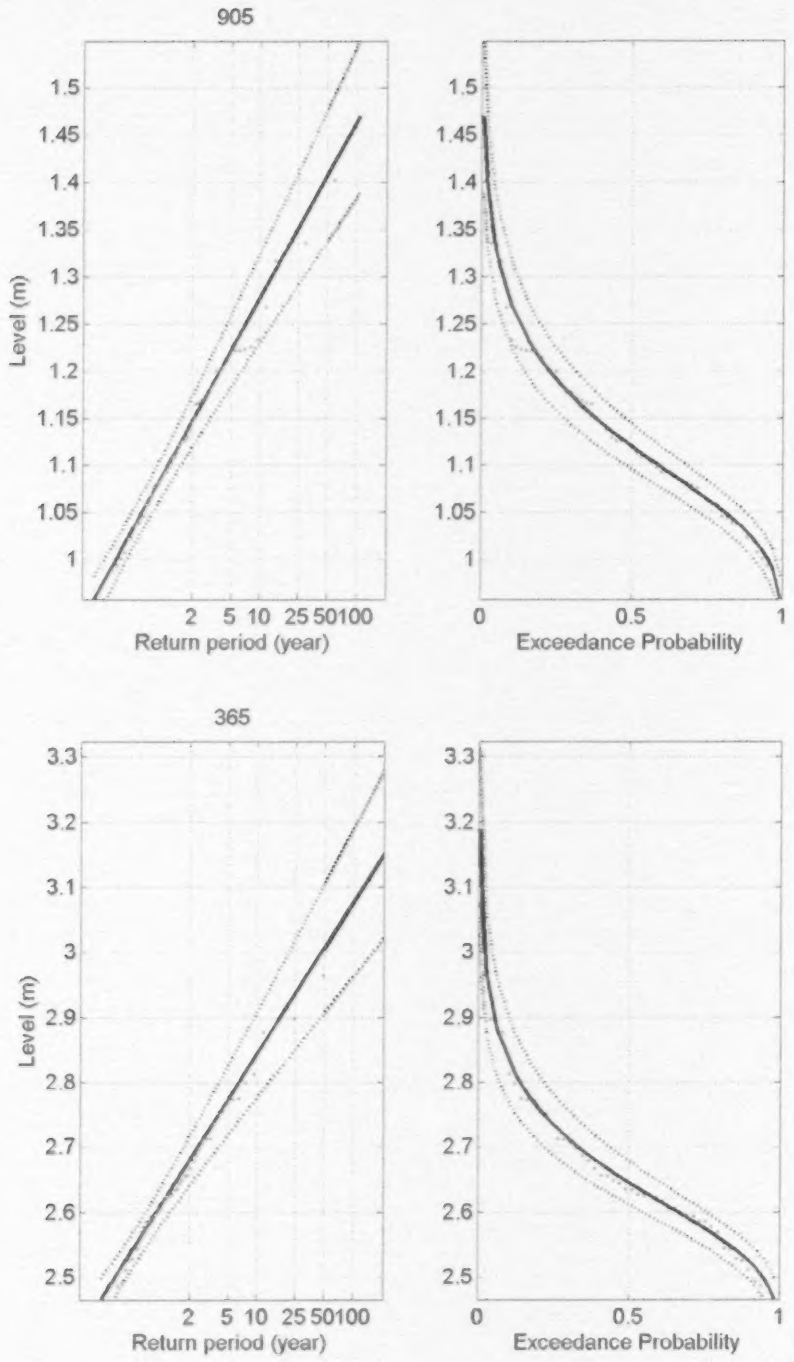

Figure 24: (Top) St John's, Newfoundland (tide gauge site 905). (Bottom) Yarmouth, Nova Scotia (tide gauge site 365).

APPENDIX A3: Statistics of tides and storm surges for tide gauges along the coast of **Washington, United States**

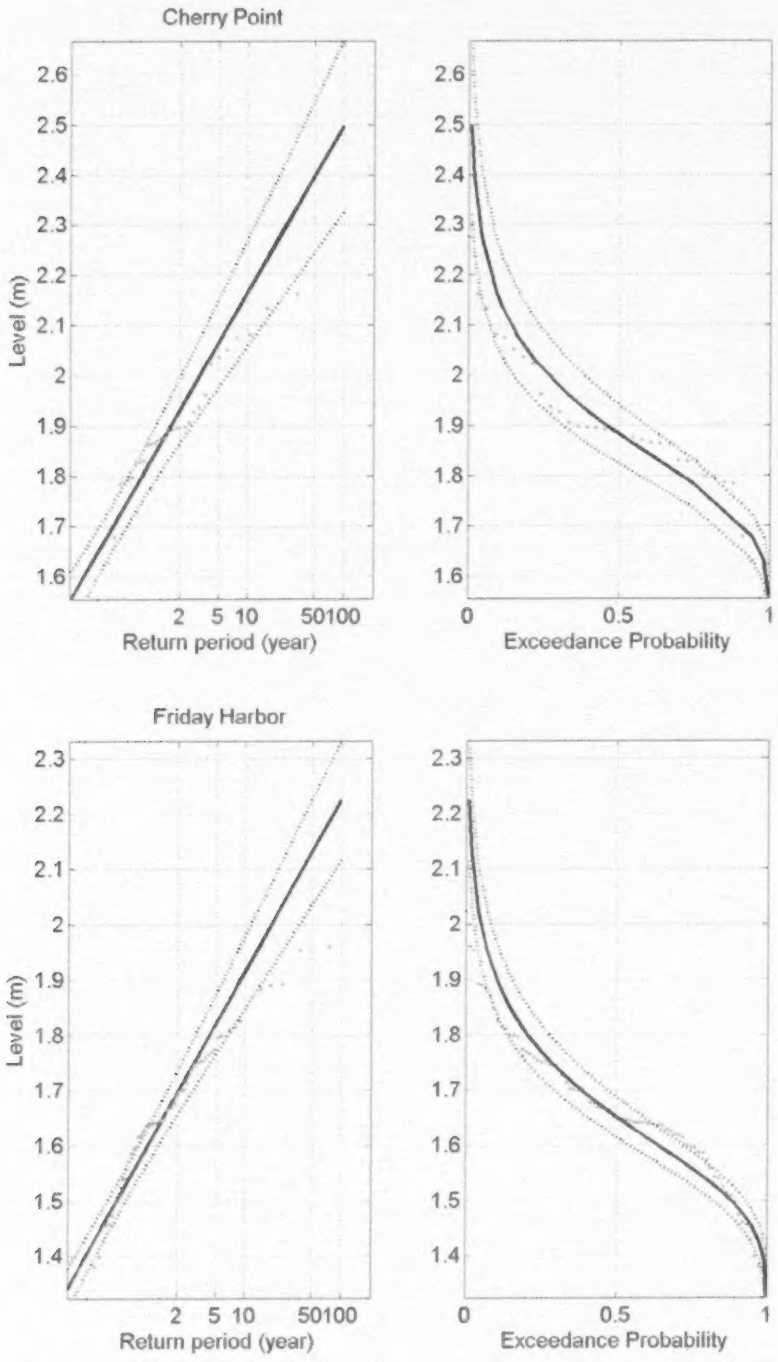

Figure 25: (Top) Cherry Point, Washington, USA. (Bottom) Friday Harbour, Washington, USA.

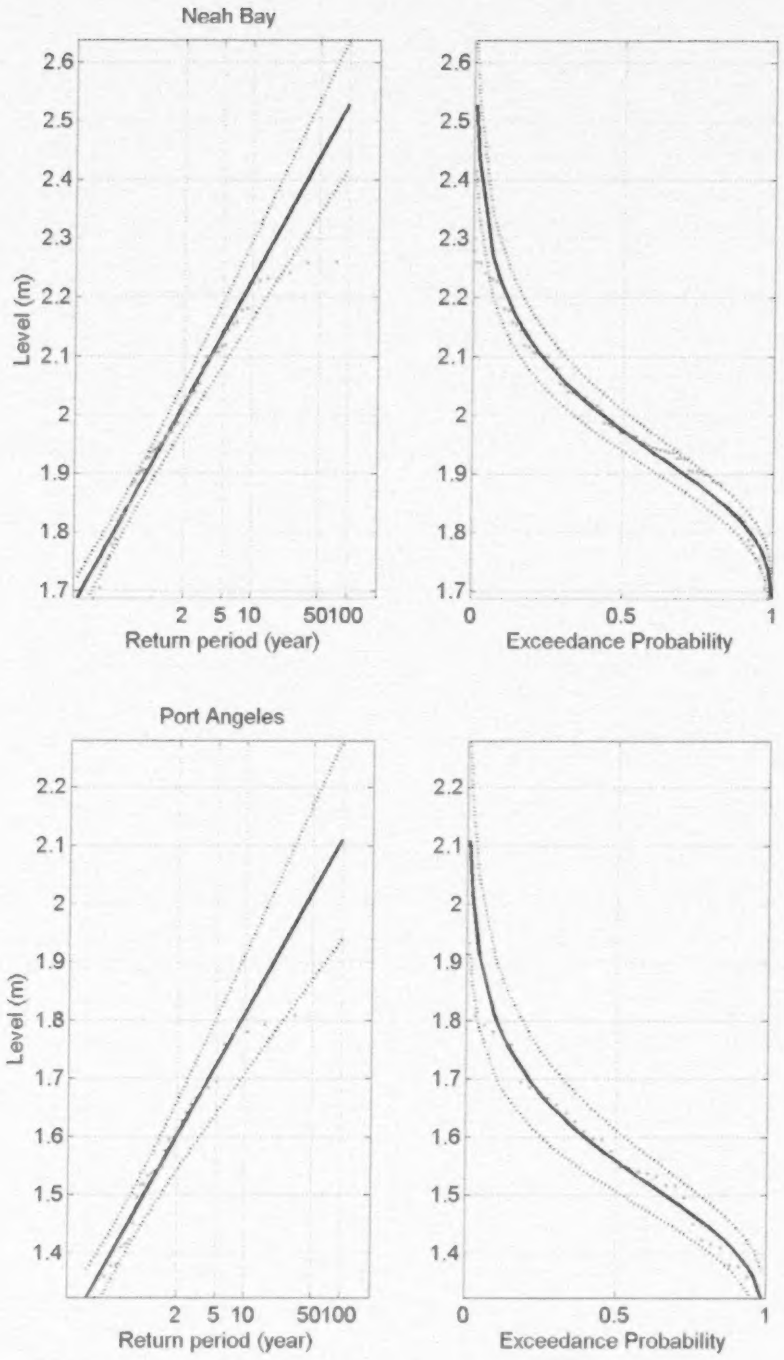

Figure 26: (Top) Neah Bay, Washington, USA. (Bottom) Port Angeles, Washington, USA.

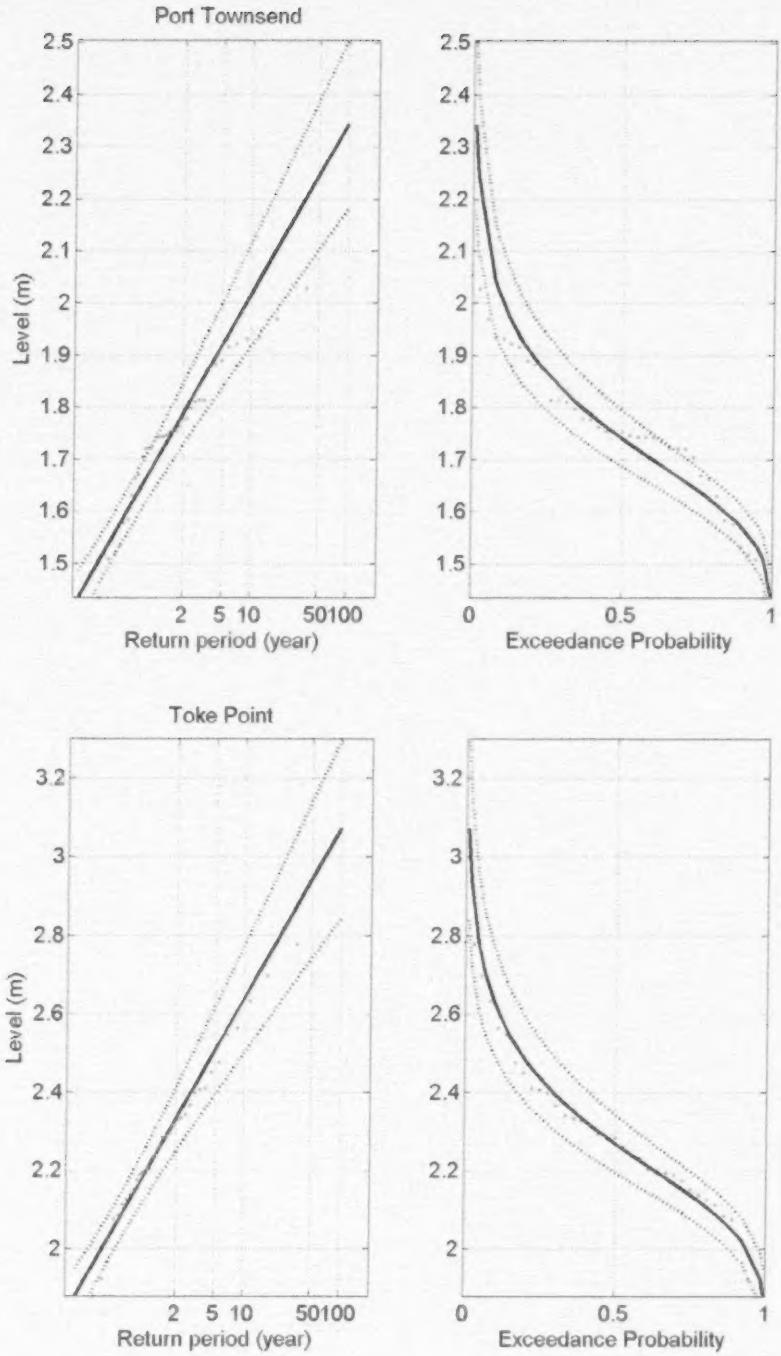

Figure 27: (Top) Port Townsend, Washington, USA. (Bottom) Toke Point, Washington, USA.

APPENDIX A4: Statistics of tides and storm surges for tide gauges along the coast of **Alaska, United States**

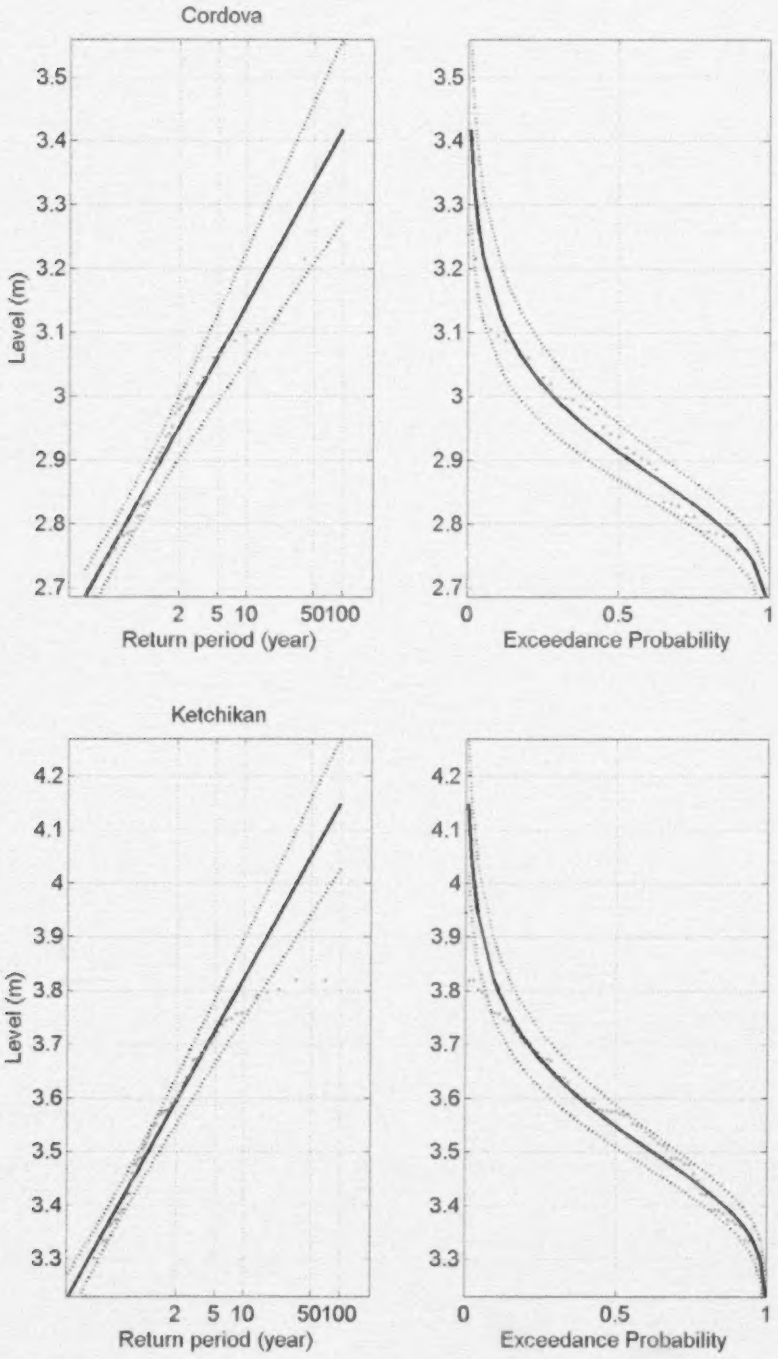

Figure 28: (Top) Cordova, Alaska, USA. (Bottom) Ketchikan, Alaska, USA.

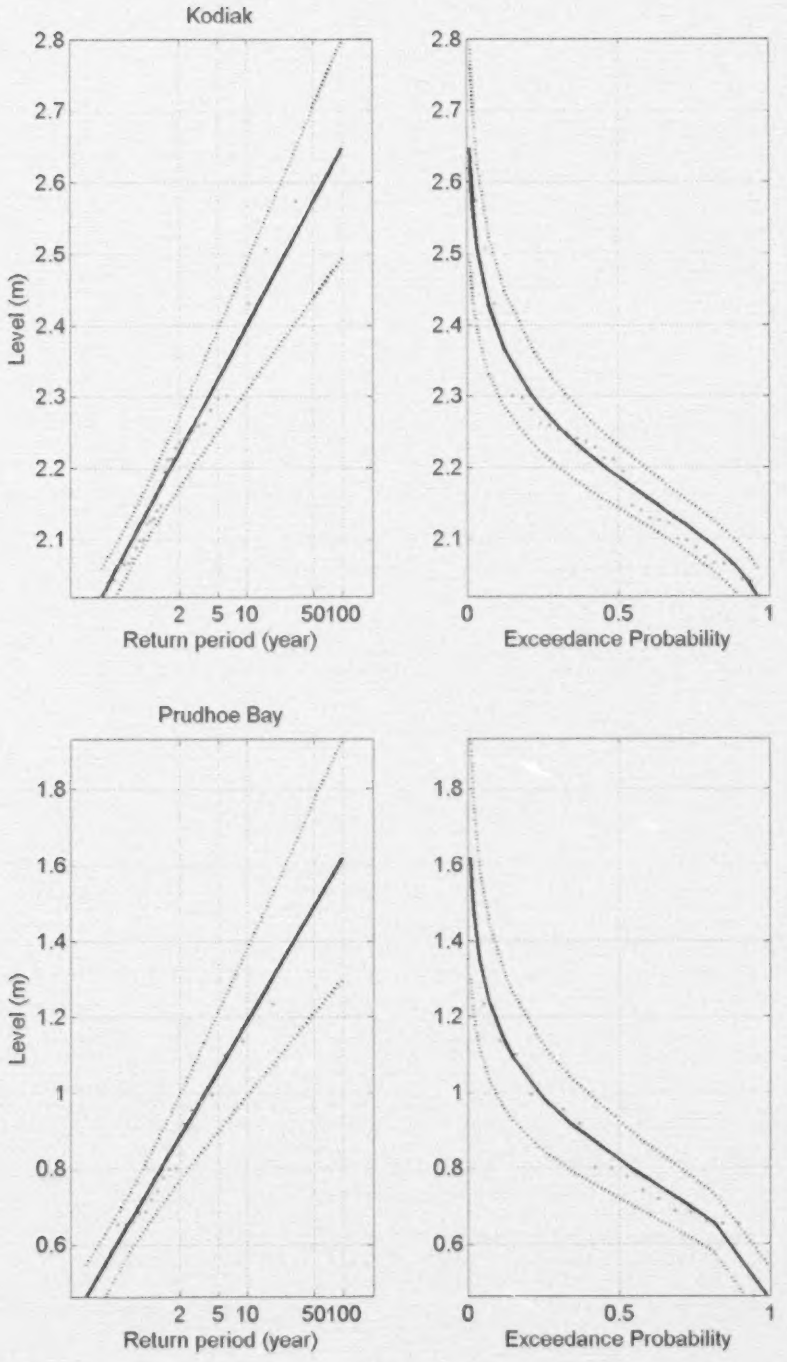

Figure 29: (Top) Kodiak, Alaska, USA. (Bottom) Prudhoe Bay, Alaska, USA.

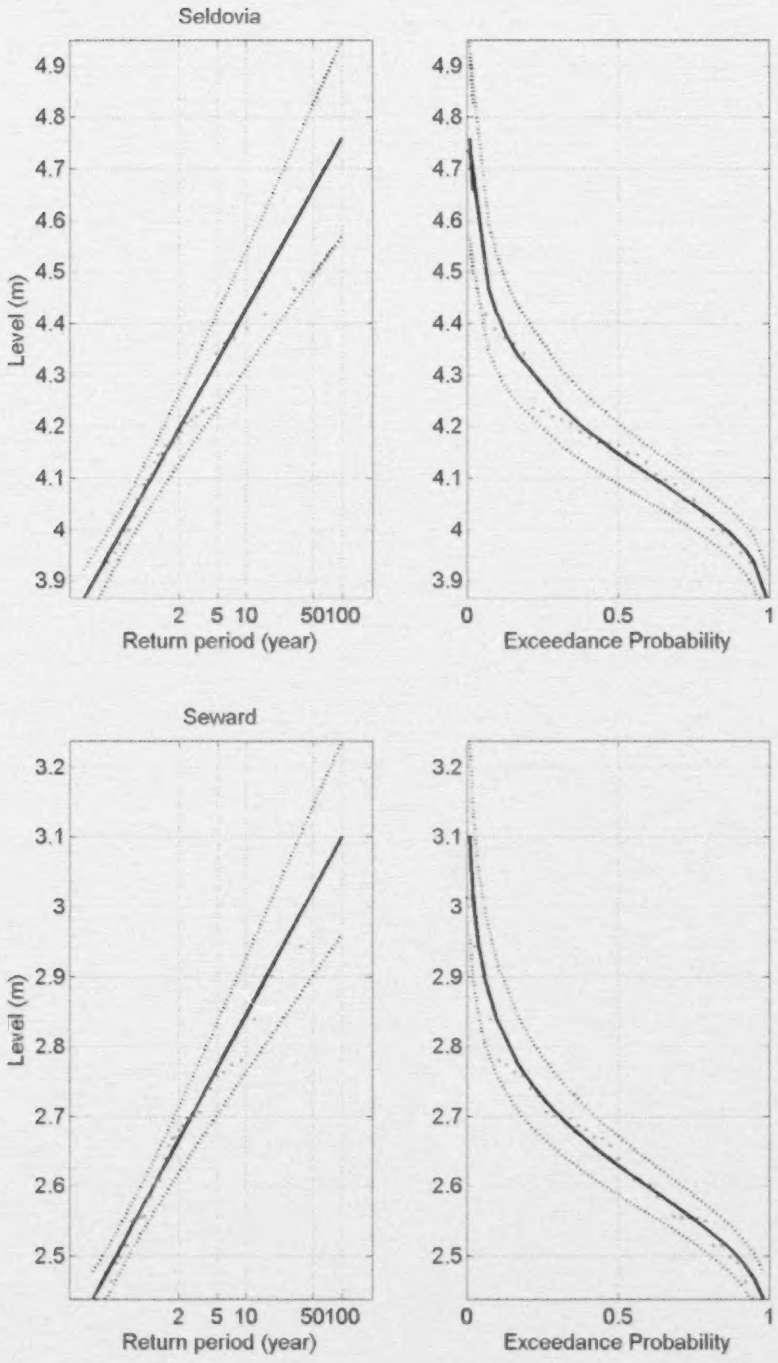

Figure 30: (Top) Seldovia, Alaska, USA. (Bottom) Seward, Alaska, USA.

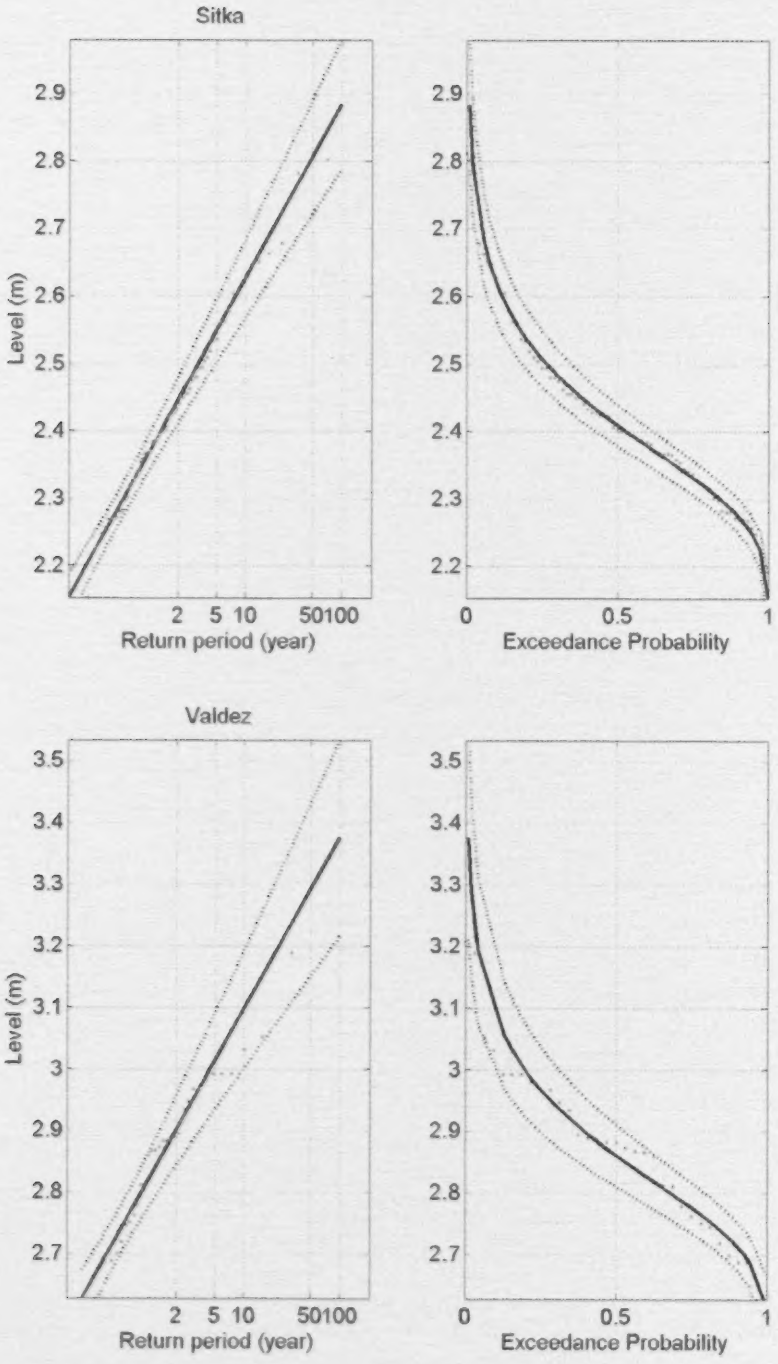

Figure 31: (Top) Sitka, Alaska, USA. (Bottom) Valdez, Alaska, USA.

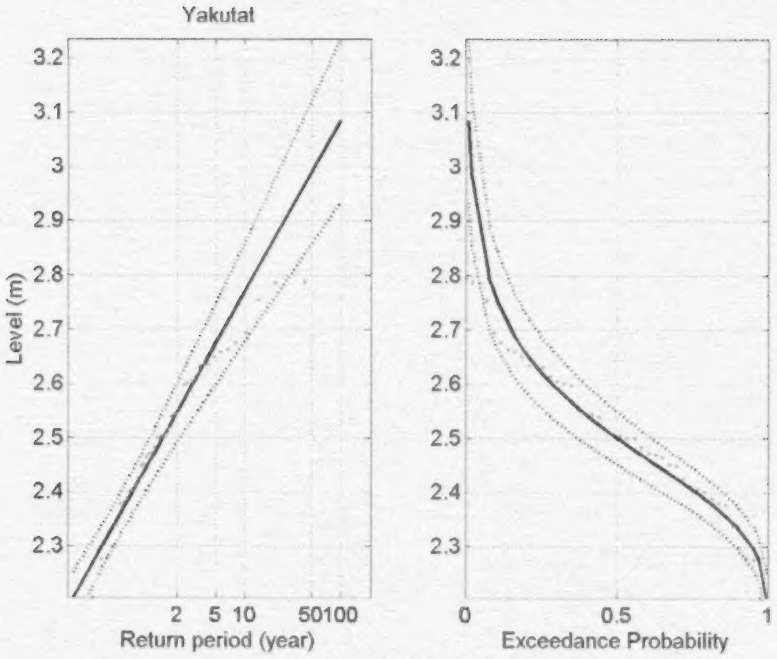

Figure 32: Yakutat, Alaska, USA.

APPENDIX A5: Statistics of tides and storm surges for tide gauges along the east coast of the United States

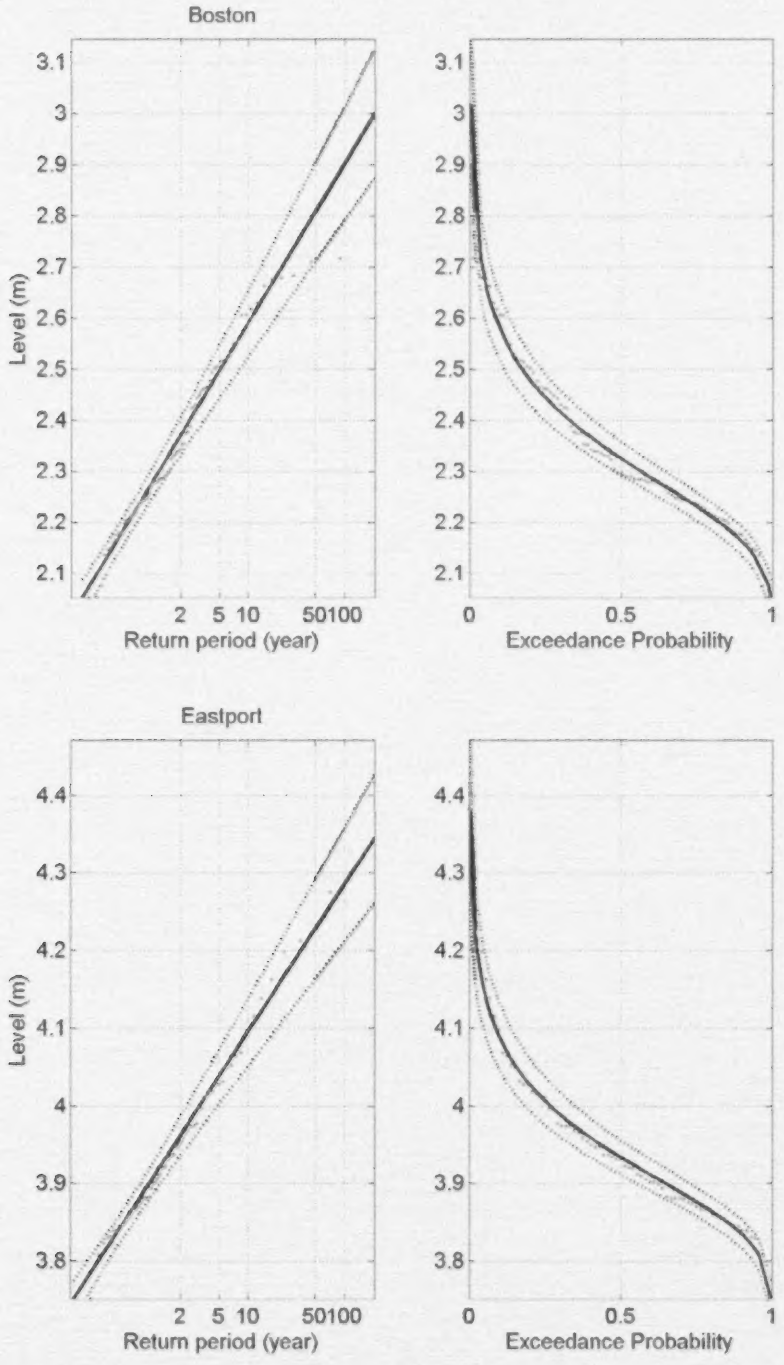

Figure 33: (Top) Boston, Massachusetts, USA. (Bottom) Eastport, Maine, USA.

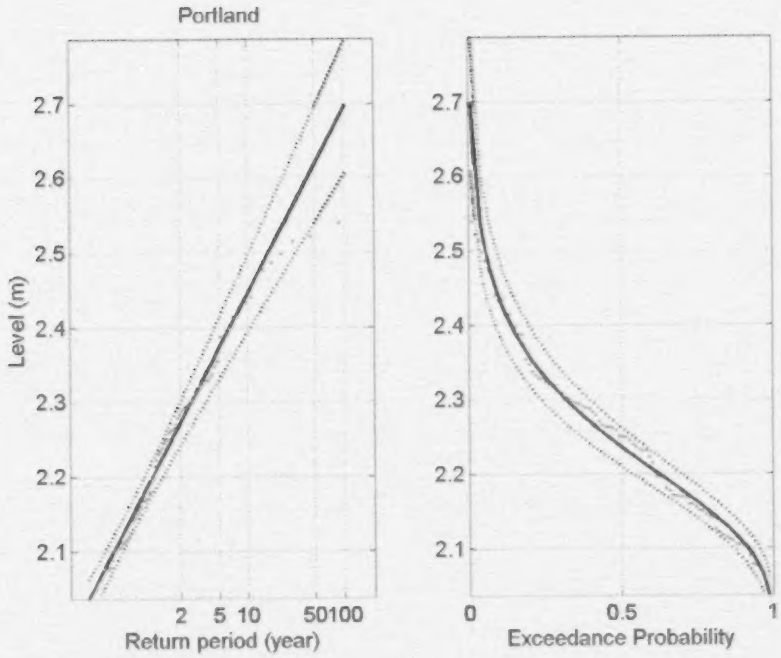

Figure 34: Portland, Maine, USA.

APPENDIX B1: Summary of projected sea-level change and sea level allowances for tide gauges along **the Canadian Pacific and Arctic coasts**. The results are given for future years with respect to year 1995 at 10-year intervals. Sea-level rise projections are corrected.

Table 9a: Sea-level projections and sea-level allowances for RCP4.5 and for Albert Bay, British Columbia.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.01	0.02	-0.02	0.05	0.01
2020	0.02	0.02	-0.02	0.06	0.02
2030	0.04	0.02	0.00	0.08	0.04
2040	0.07	0.04	-0.01	0.14	0.08
2050	0.11	0.04	0.04	0.17	0.11
2060	0.12	0.06	0.03	0.21	0.13
2070	0.16	0.07	0.05	0.27	0.17
2080	0.19	0.09	0.05	0.33	0.22
2090	0.24	0.10	0.08	0.39	0.27
2099	0.26	0.12	0.07	0.45	0.31

Table 9b: Sea-level projections and sea-level allowances for RCP8.5 and for Albert Bay, British Columbia.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.00	0.03	-0.04	0.04	0.00
2020	0.03	0.04	-0.03	0.09	0.03
2030	0.04	0.04	-0.03	0.11	0.05
2040	0.06	0.04	0.00	0.13	0.07
2050	0.10	0.05	0.02	0.18	0.11
2060	0.14	0.06	0.04	0.25	0.16
2070	0.19	0.08	0.05	0.33	0.22
2080	0.24	0.10	0.08	0.40	0.28
2090	0.33	0.12	0.13	0.52	0.38
2099	0.37	0.15	0.13	0.61	0.45

Table 10a: Sea-level projections and sea-level allowances for RCP4.5 and for Bamfield, British Columbia.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.02	0.02	-0.02	0.06	0.03
2020	0.05	0.03	0.00	0.09	0.05
2030	0.08	0.04	0.02	0.15	0.09
2040	0.12	0.05	0.03	0.20	0.13
2050	0.16	0.05	0.08	0.24	0.17
2060	0.19	0.07	0.07	0.31	0.21
2070	0.23	0.08	0.10	0.37	0.26
2080	0.28	0.10	0.11	0.45	0.32
2090	0.34	0.12	0.14	0.53	0.39
2099	0.38	0.14	0.15	0.61	0.46

Table 10b: Sea-level projections and sea-level allowances for RCP8.5 and for Bamfield, British Columbia.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.02	0.03	-0.03	0.06	0.02
2020	0.05	0.03	-0.01	0.10	0.05
2030	0.08	0.04	0.01	0.15	0.09
2040	0.11	0.05	0.03	0.20	0.12
2050	0.17	0.06	0.07	0.27	0.18
2060	0.22	0.08	0.08	0.35	0.24
2070	0.28	0.10	0.11	0.44	0.32
2080	0.35	0.12	0.14	0.55	0.40
2090	0.43	0.15	0.19	0.67	0.52
2099	0.50	0.18	0.20	0.80	0.63

Table 11a: Sea-level projections and sea-level allowances for RCP4.5 and for Bella Bella, British Columbia.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.00	0.02	-0.04	0.03	0.00
2020	0.01	0.03	-0.03	0.05	0.01
2030	0.02	0.03	-0.02	0.07	0.03
2040	0.04	0.05	-0.03	0.11	0.05
2050	0.07	0.05	-0.01	0.15	0.08
2060	0.09	0.07	-0.03	0.20	0.11
2070	0.12	0.07	-0.01	0.24	0.14
2080	0.15	0.10	-0.01	0.32	0.19
2090	0.18	0.11	-0.01	0.37	0.23
2099	0.21	0.14	-0.02	0.43	0.28

Table 11b: Sea-level projections and sea-level allowances for RCP8.5 and for Bella Bella, British Columbia.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.00	0.03	-0.04	0.04	0.00
2020	0.02	0.04	-0.04	0.07	0.02
2030	0.02	0.05	-0.05	0.10	0.03
2040	0.05	0.05	-0.03	0.13	0.06
2050	0.08	0.06	-0.02	0.17	0.09
2060	0.12	0.08	-0.01	0.25	0.14
2070	0.16	0.10	0.00	0.32	0.19
2080	0.21	0.12	0.02	0.40	0.26
2090	0.27	0.14	0.04	0.51	0.35
2099	0.32	0.17	0.04	0.61	0.44

Table 12a: Sea-level projections and sea-level allowances for RCP4.5 and for Campbell River, British Columbia.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.01	0.02	-0.03	0.05	0.01
2020	0.03	0.03	-0.02	0.07	0.03
2030	0.05	0.04	-0.01	0.11	0.05
2040	0.07	0.05	-0.01	0.15	0.08
2050	0.11	0.05	0.03	0.19	0.11
2060	0.13	0.07	0.02	0.25	0.15
2070	0.16	0.08	0.03	0.29	0.18
2080	0.20	0.10	0.03	0.37	0.24
2090	0.24	0.12	0.05	0.44	0.29
2099	0.28	0.14	0.05	0.50	0.34

Table 12b: Sea-level projections and sea-level allowances for RCP8.5 and for Campbell River, British Columbia.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.01	0.03	-0.04	0.05	0.01
2020	0.03	0.03	-0.03	0.08	0.03
2030	0.05	0.04	-0.03	0.12	0.05
2040	0.07	0.05	-0.01	0.15	0.08
2050	0.11	0.06	0.02	0.21	0.13
2060	0.15	0.08	0.02	0.29	0.18
2070	0.21	0.10	0.05	0.37	0.24
2080	0.26	0.12	0.06	0.46	0.32
2090	0.34	0.15	0.10	0.58	0.41
2099	0.40	0.18	0.10	0.69	0.51

Table 13a: Sea-level projections and sea-level allowances for RCP4.5 and for Churchill, Hudson Bay.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	-0.16	0.07	-0.28	-0.04	-0.15
2020	-0.27	0.13	-0.48	-0.06	-0.22
2030	-0.38	0.18	-0.67	-0.09	-0.29
2040	-0.48	0.23	-0.86	-0.11	-0.33
2050	-0.59	0.28	-1.04	-0.14	-0.36
2060	-0.71	0.33	-1.25	-0.17	-0.39
2070	-0.81	0.38	-1.44	-0.19	-0.38
2080	-0.92	0.43	-1.62	-0.21	-0.36
2090	-1.03	0.48	-1.83	-0.23	-0.32
2099	-1.14	0.53	-2.01	-0.27	-0.30

Table 13b: Sea-level projections and sea-level allowances for RCP8.5 and for Churchill, Hudson Bay.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	-0.16	0.08	-0.28	-0.03	-0.14
2020	-0.27	0.13	-0.48	-0.06	-0.22
2030	-0.37	0.18	-0.67	-0.08	-0.27
2040	-0.48	0.23	-0.86	-0.10	-0.32
2050	-0.56	0.29	-1.03	-0.09	-0.31
2060	-0.66	0.34	-1.21	-0.10	-0.31
2070	-0.75	0.39	-1.40	-0.10	-0.28
2080	-0.82	0.45	-1.56	-0.09	-0.22
2090	-0.91	0.50	-1.73	-0.08	-0.14
2099	-0.98	0.55	-1.89	-0.07	-0.05

Table 14a: Sea-level projections and sea-level allowances for RCP4.5 and for Fulford Harbour, British Columbia.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.01	0.02	-0.03	0.05	0.01
2020	0.04	0.03	-0.01	0.08	0.04
2030	0.06	0.04	0.00	0.13	0.07
2040	0.09	0.05	0.01	0.17	0.10
2050	0.13	0.05	0.06	0.21	0.14
2060	0.16	0.06	0.05	0.26	0.17
2070	0.20	0.07	0.07	0.32	0.22
2080	0.23	0.09	0.08	0.38	0.26
2090	0.29	0.10	0.11	0.46	0.32
2099	0.33	0.13	0.12	0.54	0.38

Table 14b: Sea-level projections and sea-level allowances for RCP8.5 and for Fulford Harbour, British Columbia.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.01	0.03	-0.04	0.06	0.01
2020	0.04	0.03	-0.02	0.09	0.04
2030	0.06	0.04	0.00	0.12	0.07
2040	0.09	0.04	0.02	0.16	0.10
2050	0.14	0.05	0.05	0.22	0.15
2060	0.18	0.07	0.06	0.29	0.19
2070	0.24	0.09	0.10	0.38	0.26
2080	0.30	0.10	0.13	0.46	0.33
2090	0.37	0.12	0.17	0.57	0.42
2099	0.44	0.15	0.19	0.69	0.52

Table 15a: Sea-level projections and sea-level allowances for RCP4.5 and for New Westminster, British Columbia.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.01	0.02	-0.03	0.05	0.01
2020	0.03	0.03	-0.02	0.07	0.03
2030	0.05	0.04	-0.01	0.11	0.05
2040	0.07	0.05	0.00	0.15	0.08
2050	0.11	0.04	0.04	0.18	0.11
2060	0.13	0.06	0.03	0.23	0.14
2070	0.16	0.07	0.05	0.28	0.18
2080	0.19	0.09	0.05	0.34	0.22
2090	0.24	0.10	0.08	0.41	0.28
2099	0.28	0.12	0.08	0.48	0.33

Table 15b: Sea-level projections and sea-level allowances for RCP8.5 and for New Westminster, British Columbia.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.00	0.03	-0.04	0.05	0.01
2020	0.03	0.03	-0.03	0.08	0.03
2030	0.05	0.04	-0.01	0.11	0.05
2040	0.07	0.04	0.00	0.14	0.07
2050	0.11	0.05	0.03	0.20	0.12
2060	0.15	0.07	0.04	0.26	0.16
2070	0.20	0.08	0.07	0.34	0.23
2080	0.26	0.10	0.10	0.42	0.29
2090	0.33	0.12	0.13	0.52	0.38
2099	0.39	0.15	0.15	0.64	0.46

Table 16a: Sea-level projections and sea-level allowances for RCP4.5 and for Patricia Bay, British Columbia.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.01	0.02	-0.03	0.05	0.02
2020	0.04	0.03	-0.01	0.08	0.04
2030	0.07	0.04	0.00	0.13	0.07
2040	0.09	0.05	0.01	0.18	0.10
2050	0.14	0.05	0.06	0.22	0.15
2060	0.16	0.06	0.06	0.27	0.18
2070	0.20	0.08	0.08	0.33	0.22
2080	0.24	0.09	0.09	0.39	0.27
2090	0.29	0.11	0.12	0.47	0.34
2099	0.33	0.13	0.12	0.54	0.40

Table 16b: Sea-level projections and sea-level allowances for RCP8.5 and for Patricia Bay, British Columbia.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.01	0.03	-0.04	0.06	0.02
2020	0.04	0.03	-0.02	0.09	0.04
2030	0.07	0.04	0.00	0.13	0.07
2040	0.09	0.04	0.02	0.16	0.10
2050	0.14	0.05	0.05	0.23	0.15
2060	0.18	0.07	0.07	0.29	0.20
2070	0.24	0.09	0.10	0.38	0.27
2080	0.30	0.10	0.13	0.47	0.34
2090	0.38	0.12	0.18	0.58	0.43
2099	0.44	0.15	0.19	0.69	0.53

Table 17a: Sea-level projections and sea-level allowances for RCP4.5 and for Point Atkinson, British Columbia.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.01	0.02	-0.03	0.05	0.01
2020	0.02	0.03	-0.02	0.07	0.03
2030	0.05	0.04	-0.01	0.11	0.05
2040	0.07	0.05	0.00	0.15	0.08
2050	0.11	0.04	0.04	0.18	0.12
2060	0.13	0.06	0.03	0.23	0.15
2070	0.16	0.07	0.04	0.28	0.18
2080	0.19	0.09	0.05	0.34	0.23
2090	0.24	0.10	0.08	0.41	0.29
2099	0.28	0.13	0.07	0.49	0.35

Table 17b: Sea-level projections and sea-level allowances for RCP8.5 and for Point Atkinson, British Columbia.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.00	0.03	-0.04	0.05	0.01
2020	0.03	0.03	-0.03	0.08	0.03
2030	0.05	0.04	-0.01	0.11	0.05
2040	0.07	0.04	0.00	0.14	0.08
2050	0.11	0.05	0.03	0.20	0.12
2060	0.15	0.07	0.04	0.26	0.17
2070	0.20	0.09	0.06	0.34	0.23
2080	0.26	0.10	0.09	0.43	0.30
2090	0.33	0.12	0.13	0.54	0.39
2099	0.39	0.16	0.14	0.65	0.49

Table 18a: Sea-level projections and sea-level allowances for RCP4.5 and for Port Hardy, British Columbia.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.02	0.02	-0.01	0.05	0.02
2020	0.02	0.02	-0.02	0.06	0.02
2030	0.04	0.02	0.00	0.07	0.04
2040	0.07	0.04	0.00	0.14	0.08
2050	0.11	0.04	0.04	0.18	0.12
2060	0.12	0.05	0.03	0.21	0.14
2070	0.16	0.06	0.05	0.27	0.18
2080	0.19	0.08	0.06	0.33	0.23
2090	0.24	0.09	0.09	0.39	0.28
2099	0.26	0.11	0.08	0.45	0.32

Table 18b: Sea-level projections and sea-level allowances for RCP8.5 and for Port Hardy, British Columbia.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.00	0.02	-0.04	0.04	0.00
2020	0.03	0.04	-0.03	0.09	0.04
2030	0.04	0.04	-0.03	0.11	0.05
2040	0.06	0.04	0.00	0.13	0.07
2050	0.10	0.05	0.02	0.18	0.11
2060	0.14	0.06	0.05	0.24	0.16
2070	0.19	0.08	0.06	0.33	0.23
2080	0.24	0.09	0.09	0.39	0.29
2090	0.33	0.11	0.14	0.51	0.39
2099	0.37	0.14	0.15	0.60	0.46

Table 19a: Sea-level projections and sea-level allowances for RCP4.5 and for Prince Rupert, British Columbia.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.00	0.03	-0.05	0.04	0.00
2020	0.00	0.03	-0.04	0.05	0.01
2030	0.02	0.03	-0.03	0.07	0.02
2040	0.04	0.05	-0.04	0.12	0.05
2050	0.07	0.05	0.00	0.15	0.08
2060	0.07	0.07	-0.03	0.18	0.09
2070	0.10	0.08	-0.03	0.24	0.13
2080	0.12	0.09	-0.03	0.28	0.15
2090	0.17	0.11	-0.02	0.35	0.21
2099	0.18	0.13	-0.03	0.40	0.24

Table 19b: Sea-level projections and sea-level allowances for RCP8.5 and for Prince Rupert, British Columbia.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	-0.01	0.02	-0.05	0.02	-0.01
2020	0.02	0.04	-0.04	0.09	0.03
2030	0.02	0.05	-0.07	0.10	0.03
2040	0.03	0.04	-0.03	0.10	0.04
2050	0.07	0.05	-0.02	0.15	0.08
2060	0.10	0.07	-0.02	0.21	0.11
2070	0.14	0.09	-0.01	0.28	0.17
2080	0.17	0.10	0.01	0.34	0.21
2090	0.25	0.11	0.07	0.44	0.29
2099	0.29	0.15	0.04	0.53	0.36

Table 20a: Sea-level projections and sea-level allowances for RCP4.5 and for Queen Charlotte City, British Columbia.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.02	0.02	-0.02	0.06	0.03
2020	0.05	0.03	0.00	0.10	0.05
2030	0.08	0.04	0.01	0.15	0.09
2040	0.12	0.06	0.02	0.21	0.13
2050	0.16	0.06	0.06	0.27	0.18
2060	0.21	0.09	0.06	0.35	0.23
2070	0.25	0.10	0.09	0.41	0.29
2080	0.30	0.12	0.11	0.50	0.35
2090	0.35	0.14	0.12	0.58	0.42
2099	0.39	0.15	0.14	0.64	0.48

Table 20b: Sea-level projections and sea-level allowances for RCP8.5 and for Queen Charlotte City, British Columbia.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.03	0.03	-0.02	0.08	0.03
2020	0.06	0.03	0.00	0.11	0.06
2030	0.08	0.05	-0.01	0.16	0.09
2040	0.12	0.06	0.02	0.22	0.13
2050	0.17	0.07	0.05	0.29	0.19
2060	0.23	0.09	0.08	0.38	0.26
2070	0.29	0.12	0.10	0.48	0.34
2080	0.36	0.14	0.14	0.58	0.43
2090	0.45	0.16	0.19	0.71	0.54
2099	0.52	0.19	0.20	0.84	0.65

Table 21a: Sea-level projections and sea-level allowances for RCP4.5 and for Tofino, British Columbia.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.02	0.02	-0.02	0.06	0.03
2020	0.05	0.03	0.01	0.09	0.05
2030	0.08	0.04	0.02	0.14	0.09
2040	0.12	0.05	0.04	0.19	0.12
2050	0.16	0.05	0.08	0.24	0.17
2060	0.20	0.07	0.08	0.31	0.21
2070	0.24	0.08	0.10	0.37	0.26
2080	0.28	0.10	0.11	0.46	0.32
2090	0.34	0.12	0.14	0.53	0.39
2099	0.38	0.14	0.15	0.61	0.45

Table 21b: Sea-level projections and sea-level allowances for RCP8.5 and for Tofino, British Columbia.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.02	0.03	-0.02	0.06	0.02
2020	0.05	0.03	0.00	0.10	0.05
2030	0.08	0.04	0.01	0.16	0.09
2040	0.12	0.05	0.03	0.20	0.13
2050	0.17	0.06	0.07	0.26	0.18
2060	0.22	0.08	0.08	0.36	0.24
2070	0.28	0.10	0.12	0.45	0.32
2080	0.35	0.12	0.14	0.55	0.40
2090	0.43	0.15	0.19	0.68	0.51
2099	0.50	0.18	0.20	0.80	0.62

Table 22a: Sea-level projections and sea-level allowances for RCP4.5 and for Tuktoyaktuk, Nunavut.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.05	0.04	-0.02	0.12	0.05
2020	0.09	0.04	0.02	0.16	0.09
2030	0.15	0.05	0.07	0.23	0.16
2040	0.20	0.05	0.11	0.28	0.20
2050	0.24	0.06	0.15	0.34	0.25
2060	0.30	0.08	0.16	0.43	0.31
2070	0.37	0.10	0.20	0.54	0.39
2080	0.41	0.13	0.21	0.62	0.45
2090	0.45	0.14	0.22	0.68	0.49
2099	0.52	0.16	0.26	0.78	0.57

Table 22b: Sea-level projections and sea-level allowances for RCP8.5 and for Tuktoyaktuk, Nunavut.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.04	0.04	-0.03	0.11	0.04
2020	0.09	0.05	0.01	0.18	0.10
2030	0.15	0.06	0.05	0.24	0.15
2040	0.22	0.05	0.14	0.30	0.22
2050	0.29	0.07	0.18	0.40	0.30
2060	0.33	0.09	0.18	0.49	0.35
2070	0.43	0.12	0.24	0.63	0.46
2080	0.52	0.15	0.27	0.77	0.57
2090	0.62	0.17	0.34	0.90	0.68
2099	0.69	0.21	0.36	1.03	0.78

Table 23a: Sea-level projections and sea-level allowances for RCP4.5 and for Vancouver, British Columbia.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.01	0.02	-0.03	0.05	0.01
2020	0.02	0.03	-0.02	0.07	0.03
2030	0.05	0.04	-0.01	0.11	0.05
2040	0.07	0.05	0.00	0.15	0.08
2050	0.11	0.04	0.04	0.18	0.12
2060	0.13	0.06	0.03	0.23	0.15
2070	0.16	0.07	0.05	0.28	0.18
2080	0.19	0.09	0.05	0.34	0.23
2090	0.24	0.10	0.08	0.41	0.29
2099	0.28	0.12	0.08	0.49	0.35

Table 23b: Sea-level projections and sea-level allowances for RCP8.5 and for Vancouver, British Columbia.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.00	0.03	-0.04	0.05	0.01
2020	0.03	0.03	-0.03	0.08	0.03
2030	0.05	0.04	-0.01	0.11	0.05
2040	0.07	0.04	0.00	0.14	0.08
2050	0.11	0.05	0.03	0.20	0.12
2060	0.15	0.07	0.04	0.26	0.17
2070	0.20	0.08	0.07	0.34	0.23
2080	0.26	0.10	0.09	0.43	0.30
2090	0.33	0.12	0.13	0.53	0.39
2099	0.39	0.15	0.14	0.64	0.49

Table 24a: Sea-level projections and sea-level allowances for RCP4.5 and for Victoria Harbour, British Columbia.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.02	0.03	-0.03	0.06	0.02
2020	0.04	0.03	-0.01	0.09	0.04
2030	0.07	0.04	0.01	0.14	0.08
2040	0.10	0.05	0.02	0.18	0.11
2050	0.14	0.05	0.06	0.23	0.15
2060	0.17	0.07	0.06	0.28	0.19
2070	0.21	0.08	0.09	0.34	0.23
2080	0.25	0.09	0.10	0.40	0.28
2090	0.31	0.11	0.13	0.48	0.35
2099	0.35	0.13	0.14	0.56	0.41

Table 24b: Sea-level projections and sea-level allowances for RCP8.5 and for Victoria Harbour, British Columbia.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.01	0.03	-0.04	0.06	0.02
2020	0.04	0.03	-0.01	0.10	0.05
2030	0.07	0.04	0.01	0.13	0.07
2040	0.10	0.04	0.02	0.17	0.10
2050	0.15	0.05	0.06	0.24	0.16
2060	0.19	0.07	0.08	0.30	0.21
2070	0.25	0.09	0.11	0.39	0.28
2080	0.31	0.10	0.15	0.48	0.35
2090	0.39	0.12	0.19	0.59	0.44
2099	0.46	0.15	0.21	0.70	0.54

APPENDIX B2: Summary of sea level allowances for tide gauges along the east coast of Canada.

Table 25a: Sea-level projections and sea-level allowances for RCP4.5 and for Argentia, Newfoundland.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.07	0.02	0.03	0.11	0.07
2020	0.11	0.04	0.05	0.17	0.12
2030	0.17	0.05	0.09	0.25	0.18
2040	0.23	0.06	0.14	0.33	0.25
2050	0.30	0.07	0.18	0.41	0.32
2060	0.36	0.09	0.21	0.50	0.40
2070	0.42	0.11	0.23	0.60	0.48
2080	0.48	0.14	0.25	0.70	0.58
2090	0.53	0.15	0.27	0.78	0.66
2099	0.57	0.17	0.30	0.84	0.72

Table 25b: Sea-level projections and sea-level allowances for RCP8.5 and for Argentia, Newfoundland.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.07	0.02	0.03	0.11	0.08
2020	0.12	0.03	0.07	0.17	0.13
2030	0.19	0.05	0.12	0.27	0.20
2040	0.25	0.06	0.15	0.35	0.27
2050	0.33	0.08	0.19	0.46	0.36
2060	0.42	0.10	0.26	0.58	0.47
2070	0.50	0.13	0.29	0.71	0.59
2080	0.60	0.15	0.35	0.85	0.72
2090	0.70	0.18	0.41	0.99	0.87
2099	0.79	0.21	0.44	1.13	1.03

Table 26a: Sea-level projections and sea-level allowances for RCP4.5 and.for Cap-aux-Meules, Québec.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.06	0.05	-0.02	0.14	0.07
2020	0.10	0.08	-0.03	0.23	0.13
2030	0.15	0.11	-0.03	0.34	0.21
2040	0.22	0.14	0.00	0.45	0.30
2050	0.28	0.17	0.00	0.55	0.40
2060	0.33	0.20	-0.01	0.66	0.51
2070	0.38	0.23	0.00	0.76	0.62
2080	0.44	0.27	0.00	0.88	0.76
2090	0.50	0.30	0.00	1.00	0.91
2099	0.53	0.33	-0.01	1.08	1.02

Table 26b: Sea-level projections and sea-level allowances for RCP8.5 and.for Cap-aux-Meules, Québec.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.07	0.05	-0.01	0.15	0.08
2020	0.11	0.08	-0.02	0.24	0.13
2030	0.18	0.11	-0.01	0.36	0.23
2040	0.23	0.14	0.00	0.47	0.32
2050	0.31	0.18	0.02	0.60	0.45
2060	0.40	0.21	0.06	0.74	0.59
2070	0.47	0.25	0.06	0.88	0.74
2080	0.57	0.28	0.10	1.03	0.92
2090	0.67	0.32	0.14	1.19	1.12
2099	0.75	0.36	0.16	1.34	1.32

Table 27a: Sea-level projections and sea-level allowances for RCP4.5 and.for Charlottetown, Prince Edward Island.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.05	0.04	-0.01	0.12	0.06
2020	0.09	0.07	-0.02	0.20	0.10
2030	0.14	0.10	-0.02	0.29	0.17
2040	0.21	0.11	0.02	0.40	0.25
2050	0.26	0.13	0.04	0.48	0.32
2060	0.31	0.17	0.04	0.59	0.40
2070	0.37	0.19	0.06	0.68	0.48
2080	0.42	0.22	0.06	0.79	0.58
2090	0.48	0.25	0.06	0.89	0.68
2099	0.52	0.27	0.07	0.96	0.76

Table 27b: Sea-level projections and sea-level allowances for RCP8.5 and.for Charlottetown, Prince Edward Island.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.07	0.04	0.01	0.14	0.08
2020	0.11	0.07	-0.01	0.22	0.12
2030	0.17	0.09	0.02	0.32	0.20
2040	0.22	0.12	0.02	0.42	0.27
2050	0.30	0.15	0.06	0.54	0.37
2060	0.38	0.17	0.10	0.67	0.48
2070	0.45	0.21	0.10	0.79	0.59
2080	0.55	0.24	0.14	0.95	0.74
2090	0.65	0.28	0.20	1.11	0.90
2099	0.73	0.30	0.23	1.22	1.02

Table 28a: Sea-level projections and sea-level allowances for RCP4.5 and.for Halifax, Nova Scotia.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.06	0.03	0.01	0.11	0.06
2020	0.10	0.06	0.01	0.19	0.12
2030	0.16	0.07	0.04	0.28	0.18
2040	0.23	0.08	0.09	0.36	0.26
2050	0.28	0.09	0.13	0.43	0.32
2060	0.34	0.12	0.14	0.53	0.41
2070	0.40	0.14	0.17	0.63	0.50
2080	0.47	0.17	0.20	0.74	0.61
2090	0.54	0.19	0.22	0.86	0.72
2099	0.56	0.21	0.21	0.91	0.78

Table 28b: Sea-level projections and sea-level allowances for RCP8.5 and.for Halifax, Nova Scotia.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.07	0.03	0.01	0.12	0.07
2020	0.10	0.04	0.03	0.18	0.11
2030	0.17	0.07	0.06	0.28	0.20
2040	0.23	0.09	0.09	0.38	0.27
2050	0.32	0.11	0.13	0.50	0.38
2060	0.41	0.13	0.20	0.62	0.49
2070	0.49	0.16	0.22	0.75	0.61
2080	0.59	0.19	0.27	0.90	0.77
2090	0.70	0.22	0.35	1.06	0.93
2099	0.80	0.25	0.38	1.21	1.11

Table 29a: Sea-level projections and sea-level allowances for RCP4.5 and for Harrington Harbour, Québec.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.01	0.02	-0.03	0.04	0.01
2020	0.01	0.05	-0.07	0.09	0.02
2030	0.02	0.06	-0.08	0.12	0.04
2040	0.04	0.07	-0.07	0.15	0.06
2050	0.06	0.08	-0.06	0.19	0.09
2060	0.07	0.10	-0.10	0.25	0.12
2070	0.09	0.12	-0.10	0.29	0.16
2080	0.10	0.14	-0.12	0.33	0.19
2090	0.13	0.17	-0.15	0.40	0.25
2099	0.11	0.18	-0.18	0.41	0.26

Table 29b: Sea-level projections and sea-level allowances for RCP8.5 and for Harrington Harbour, Québec.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.01	0.03	-0.04	0.06	0.02
2020	0.01	0.04	-0.06	0.09	0.02
2030	0.04	0.06	-0.06	0.14	0.05
2040	0.06	0.08	-0.07	0.19	0.08
2050	0.09	0.09	-0.06	0.24	0.13
2060	0.14	0.11	-0.04	0.33	0.20
2070	0.17	0.14	-0.07	0.40	0.26
2080	0.22	0.16	-0.05	0.49	0.34
2090	0.27	0.19	-0.04	0.59	0.43
2099	0.32	0.21	-0.03	0.67	0.52

Table 30a: Sea-level projections and sea-level allowances for RCP4.5 and for Lauzon, Québec.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	-0.01	0.03	-0.07	0.04	-0.01
2020	0.00	0.08	-0.13	0.12	0.01
2030	0.03	0.11	-0.15	0.20	0.06
2040	0.04	0.12	-0.16	0.24	0.08
2050	0.07	0.14	-0.16	0.29	0.11
2060	0.08	0.18	-0.22	0.38	0.17
2070	0.10	0.20	-0.24	0.43	0.21
2080	0.12	0.24	-0.27	0.51	0.27
2090	0.15	0.27	-0.29	0.60	0.34
2099	0.14	0.30	-0.35	0.64	0.38

Table 30b: Sea-level projections and sea-level allowances for RCP8.5 and for Lauzon, Québec.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.01	0.04	-0.06	0.09	0.02
2020	0.02	0.07	-0.09	0.13	0.03
2030	0.02	0.10	-0.13	0.18	0.05
2040	0.04	0.14	-0.20	0.27	0.09
2050	0.08	0.16	-0.17	0.34	0.15
2060	0.14	0.19	-0.17	0.46	0.24
2070	0.18	0.22	-0.17	0.54	0.31
2080	0.24	0.26	-0.20	0.67	0.42
2090	0.30	0.29	-0.18	0.79	0.53
2099	0.36	0.33	-0.19	0.91	0.65

Table 31a: Sea-level projections and sea-level allowances for RCP4.5 and for Lower Escuminac, New Brunswick.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.04	0.05	-0.03	0.12	0.05
2020	0.08	0.08	-0.05	0.21	0.10
2030	0.14	0.11	-0.05	0.32	0.18
2040	0.20	0.14	-0.02	0.43	0.27
2050	0.25	0.16	-0.01	0.52	0.34
2060	0.30	0.20	-0.03	0.64	0.44
2070	0.35	0.23	-0.02	0.73	0.53
2080	0.41	0.27	-0.03	0.85	0.65
2090	0.47	0.30	-0.02	0.97	0.78
2099	0.49	0.33	-0.04	1.03	0.85

Table 31b: Sea-level projections and sea-level allowances for RCP8.5 and for Lower Escuminac, New Brunswick.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.07	0.05	-0.01	0.15	0.08
2020	0.10	0.08	-0.03	0.23	0.12
2030	0.15	0.11	-0.03	0.34	0.19
2040	0.20	0.15	-0.04	0.44	0.27
2050	0.28	0.18	-0.01	0.58	0.39
2060	0.37	0.21	0.03	0.71	0.51
2070	0.44	0.25	0.03	0.85	0.64
2080	0.53	0.28	0.06	1.00	0.80
2090	0.64	0.32	0.11	1.16	0.98
2099	0.71	0.36	0.11	1.31	1.15

Table 32a: Sea-level projections and sea-level allowances for RCP4.5 and for Nain, Newfoundland.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	-0.03	0.07	-0.15	0.08	-0.01
2020	-0.06	0.12	-0.26	0.14	0.01
2030	-0.10	0.17	-0.38	0.17	0.03
2040	-0.12	0.22	-0.48	0.23	0.09
2050	-0.14	0.27	-0.58	0.29	0.18
2060	-0.18	0.31	-0.70	0.34	0.28
2070	-0.19	0.37	-0.79	0.41	0.43
2080	-0.22	0.41	-0.90	0.46	0.56
2090	-0.26	0.47	-1.03	0.50	0.74
2099	-0.30	0.51	-1.13	0.54	0.90

Table 32b: Sea-level projections and sea-level allowances for RCP8.5 and for Nain, Newfoundland.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	-0.04	0.07	-0.16	0.09	-0.01
2020	-0.06	0.12	-0.27	0.14	0.01
2030	-0.08	0.17	-0.37	0.20	0.05
2040	-0.11	0.22	-0.47	0.25	0.11
2050	-0.12	0.27	-0.57	0.33	0.22
2060	-0.13	0.32	-0.66	0.40	0.35
2070	-0.14	0.38	-0.76	0.49	0.53
2080	-0.13	0.43	-0.84	0.58	0.73
2090	-0.14	0.48	-0.94	0.66	0.94
2099	-0.15	0.53	-1.03	0.72	1.15

Table 33a: Sea-level projections and sea-level allowances for RCP4.5 and for North Sydney, Nova Scotia.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.06	0.03	0.01	0.12	0.07
2020	0.11	0.06	0.02	0.21	0.13
2030	0.17	0.08	0.04	0.30	0.20
2040	0.25	0.09	0.09	0.40	0.28
2050	0.31	0.11	0.12	0.49	0.36
2060	0.37	0.15	0.13	0.61	0.46
2070	0.43	0.17	0.15	0.70	0.55
2080	0.49	0.19	0.17	0.81	0.66
2090	0.56	0.22	0.20	0.93	0.78
2099	0.60	0.24	0.20	1.00	0.85

Table 33b: Sea-level projections and sea-level allowances for RCP8.5 and for North Sydney, Nova Scotia.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.08	0.03	0.02	0.13	0.08
2020	0.12	0.06	0.03	0.22	0.14
2030	0.20	0.08	0.07	0.32	0.22
2040	0.26	0.10	0.09	0.42	0.30
2050	0.34	0.13	0.13	0.55	0.41
2060	0.44	0.15	0.20	0.68	0.53
2070	0.51	0.18	0.21	0.82	0.66
2080	0.62	0.21	0.27	0.98	0.82
2090	0.72	0.24	0.32	1.12	0.97
2099	0.82	0.28	0.36	1.28	1.15

Table 34a: Sea-level projections and sea-level allowances for RCP4.5 and for Pictou, Nova Scotia.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.06	0.03	0.00	0.12	0.06
2020	0.10	0.06	0.00	0.20	0.11
2030	0.15	0.08	0.02	0.29	0.17
2040	0.22	0.10	0.06	0.39	0.25
2050	0.28	0.11	0.09	0.47	0.32
2060	0.33	0.15	0.09	0.57	0.39
2070	0.39	0.17	0.12	0.66	0.46
2080	0.45	0.20	0.13	0.77	0.55
2090	0.51	0.23	0.14	0.88	0.65
2099	0.55	0.24	0.15	0.95	0.71

Table 34b: Sea-level projections and sea-level allowances for RCP8.5 and for Pictou, Nova Scotia.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.07	0.04	0.01	0.13	0.08
2020	0.11	0.06	0.01	0.21	0.12
2030	0.18	0.08	0.05	0.31	0.19
2040	0.23	0.10	0.06	0.40	0.26
2050	0.31	0.13	0.10	0.52	0.36
2060	0.40	0.15	0.16	0.65	0.47
2070	0.47	0.19	0.17	0.78	0.57
2080	0.58	0.22	0.22	0.93	0.70
2090	0.68	0.25	0.28	1.09	0.85
2099	0.77	0.28	0.31	1.23	0.98

Table 35a: Sea-level projections and sea-level allowances for RCP4.5 and for Pointe-au-Père, Québec.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.00	0.04	-0.08	0.07	0.00
2020	0.02	0.09	-0.13	0.16	0.05
2030	0.05	0.12	-0.15	0.26	0.11
2040	0.07	0.15	-0.17	0.31	0.16
2050	0.10	0.17	-0.17	0.38	0.22
2060	0.13	0.22	-0.23	0.48	0.31
2070	0.15	0.25	-0.25	0.55	0.39
2080	0.18	0.28	-0.29	0.65	0.51
2090	0.22	0.32	-0.31	0.74	0.63
2099	0.21	0.36	-0.37	0.80	0.73

Table 35b: Sea-level projections and sea-level allowances for RCP8.5 and for Pointe-au-Père, Québec.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.02	0.05	-0.06	0.11	0.03
2020	0.04	0.08	-0.10	0.17	0.06
2030	0.05	0.12	-0.14	0.24	0.10
2040	0.07	0.16	-0.20	0.34	0.18
2050	0.12	0.18	-0.18	0.42	0.26
2060	0.19	0.23	-0.18	0.56	0.39
2070	0.23	0.26	-0.19	0.65	0.50
2080	0.29	0.30	-0.21	0.79	0.67
2090	0.37	0.34	-0.19	0.93	0.84
2099	0.43	0.38	-0.20	1.06	1.03

Table 36a: Sea-level projections and sea-level allowances for RCP4.5 and for Port aux Basques, Newfoundland.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.06	0.03	0.00	0.11	0.06
2020	0.10	0.06	0.00	0.20	0.12
2030	0.15	0.08	0.01	0.28	0.19
2040	0.21	0.10	0.05	0.37	0.27
2050	0.26	0.12	0.07	0.46	0.35
2060	0.32	0.15	0.07	0.56	0.46
2070	0.37	0.17	0.08	0.65	0.56
2080	0.42	0.20	0.09	0.75	0.67
2090	0.48	0.23	0.10	0.86	0.80
2099	0.51	0.25	0.10	0.92	0.89

Table 36b: Sea-level projections and sea-level allowances for RCP8.5 and for Port aux Basques, Newfoundland.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.07	0.04	0.00	0.13	0.07
2020	0.10	0.06	0.01	0.20	0.13
2030	0.17	0.08	0.04	0.30	0.21
2040	0.22	0.11	0.05	0.40	0.29
2050	0.30	0.13	0.08	0.51	0.40
2060	0.39	0.15	0.13	0.64	0.53
2070	0.45	0.19	0.15	0.76	0.67
2080	0.55	0.22	0.20	0.90	0.84
2090	0.64	0.25	0.24	1.05	1.02
2099	0.73	0.28	0.27	1.18	1.21

Table 37a: Sea-level projections and sea-level allowances for RCP4.5 and for Rimouski, Québec.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.00	0.04	-0.08	0.07	0.00
2020	0.02	0.09	-0.13	0.16	0.05
2030	0.05	0.12	-0.15	0.26	0.13
2040	0.07	0.15	-0.17	0.31	0.18
2050	0.10	0.17	-0.17	0.38	0.24
2060	0.13	0.22	-0.23	0.48	0.35
2070	0.15	0.24	-0.25	0.55	0.44
2080	0.18	0.28	-0.29	0.65	0.57
2090	0.22	0.32	-0.30	0.74	0.71
2099	0.21	0.36	-0.37	0.80	0.83

Table 37b: Sea-level projections and sea-level allowances for RCP8.5 and for Rimouski, Québec.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.02	0.05	-0.06	0.11	0.04
2020	0.04	0.08	-0.10	0.17	0.07
2030	0.05	0.12	-0.14	0.24	0.11
2040	0.07	0.16	-0.20	0.34	0.20
2050	0.12	0.18	-0.18	0.42	0.29
2060	0.19	0.22	-0.18	0.56	0.43
2070	0.24	0.25	-0.18	0.65	0.55
2080	0.29	0.30	-0.20	0.79	0.75
2090	0.37	0.34	-0.19	0.93	0.93
2099	0.43	0.38	-0.20	1.06	1.15

Table 38a: Sea-level projections and sea-level allowances for RCP4.5 and for Rivière-au-Renard, Québec.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.02	0.05	-0.06	0.10	0.03
2020	0.06	0.09	-0.08	0.20	0.10
2030	0.11	0.12	-0.10	0.31	0.18
2040	0.16	0.15	-0.09	0.41	0.27
2050	0.20	0.18	-0.10	0.50	0.35
2060	0.24	0.22	-0.12	0.61	0.47
2070	0.28	0.25	-0.13	0.69	0.57
2080	0.33	0.29	-0.14	0.81	0.72
2090	0.38	0.33	-0.16	0.92	0.89
2099	0.40	0.35	-0.18	0.98	0.99

Table 38b: Sea-level projections and sea-level allowances for RCP8.5 and for Rivière-au-Renard, Québec.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.05	0.05	-0.04	0.14	0.07
2020	0.07	0.09	-0.07	0.21	0.11
2030	0.13	0.12	-0.07	0.33	0.20
2040	0.16	0.16	-0.10	0.42	0.28
2050	0.24	0.19	-0.08	0.55	0.40
2060	0.30	0.23	-0.07	0.68	0.55
2070	0.37	0.27	-0.07	0.81	0.70
2080	0.45	0.31	-0.05	0.95	0.89
2090	0.54	0.34	-0.02	1.11	1.09
2099	0.61	0.39	-0.03	1.25	1.32

Table 39a: Sea-level projections and sea-level allowances for RCP4.5 and for Saint John, New Brunswick.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.04	0.03	-0.01	0.09	0.04
2020	0.08	0.06	-0.02	0.18	0.09
2030	0.12	0.08	-0.02	0.25	0.15
2040	0.17	0.09	0.02	0.32	0.21
2050	0.21	0.10	0.04	0.38	0.26
2060	0.26	0.14	0.03	0.48	0.34
2070	0.30	0.16	0.05	0.56	0.42
2080	0.36	0.18	0.05	0.66	0.51
2090	0.41	0.22	0.06	0.76	0.62
2099	0.43	0.23	0.04	0.81	0.68

Table 39b: Sea-level projections and sea-level allowances for RCP8.5 and for Saint John, New Brunswick.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.05	0.04	-0.01	0.12	0.06
2020	0.08	0.06	-0.02	0.18	0.10
2030	0.14	0.07	0.02	0.26	0.16
2040	0.18	0.10	0.02	0.33	0.22
2050	0.25	0.12	0.05	0.45	0.32
2060	0.33	0.14	0.09	0.56	0.42
2070	0.39	0.17	0.10	0.67	0.52
2080	0.48	0.20	0.15	0.82	0.67
2090	0.58	0.23	0.19	0.96	0.83
2099	0.66	0.27	0.21	1.11	1.00

Table 40a: Sea-level projections and sea-level allowances for RCP4.5 and for Saint-Anne-Des-Monts, Québec.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.01	0.04	-0.07	0.08	0.01
2020	0.03	0.09	-0.11	0.18	0.07
2030	0.07	0.12	-0.13	0.28	0.14
2040	0.10	0.15	-0.14	0.34	0.20
2050	0.14	0.17	-0.14	0.42	0.27
2060	0.17	0.22	-0.19	0.52	0.38
2070	0.20	0.25	-0.21	0.60	0.47
2080	0.23	0.29	-0.24	0.70	0.60
2090	0.28	0.32	-0.24	0.81	0.73
2099	0.28	0.36	-0.30	0.87	0.85

Table 40b: Sea-level projections and sea-level allowances for RCP8.5 and for Saint-Anne-Des-Monts, Québec.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.03	0.05	-0.05	0.12	0.05
2020	0.05	0.08	-0.08	0.19	0.08
2030	0.07	0.12	-0.12	0.26	0.13
2040	0.10	0.16	-0.17	0.37	0.22
2050	0.16	0.18	-0.15	0.46	0.31
2060	0.23	0.23	-0.14	0.60	0.45
2070	0.28	0.26	-0.14	0.70	0.57
2080	0.35	0.30	-0.15	0.85	0.76
2090	0.43	0.34	-0.13	0.99	0.95
2099	0.50	0.38	-0.13	1.13	1.16

Table 41a: Sea-level projections and sea-level allowances for RCP4.5 and for Saint-François IO, Québec.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	-0.01	0.04	-0.07	0.05	-0.01
2020	0.00	0.08	-0.13	0.13	0.02
2030	0.03	0.11	-0.15	0.21	0.06
2040	0.04	0.13	-0.16	0.25	0.09
2050	0.07	0.14	-0.16	0.30	0.12
2060	0.09	0.19	-0.22	0.39	0.18
2070	0.10	0.21	-0.24	0.45	0.22
2080	0.13	0.25	-0.28	0.53	0.29
2090	0.16	0.27	-0.29	0.61	0.36
2099	0.15	0.31	-0.36	0.66	0.41

Table 41b: Sea-level projections and sea-level allowances for RCP8.5 and for Saint-François IO, Québec.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.02	0.05	-0.06	0.09	0.02
2020	0.02	0.07	-0.10	0.14	0.04
2030	0.03	0.10	-0.14	0.19	0.05
2040	0.04	0.15	-0.20	0.28	0.10
2050	0.09	0.16	-0.17	0.35	0.16
2060	0.15	0.20	-0.18	0.47	0.25
2070	0.19	0.22	-0.17	0.55	0.32
2080	0.24	0.27	-0.20	0.68	0.44
2090	0.31	0.30	-0.18	0.80	0.55
2099	0.37	0.34	-0.19	0.93	0.68

Table 42a: Sea-level projections and sea-level allowances for RCP4.5 and for Saint-Joseph-de-la-Rive, Québec.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	-0.01	0.04	-0.08	0.05	-0.01
2020	0.00	0.08	-0.13	0.13	0.02
2030	0.03	0.11	-0.16	0.22	0.07
2040	0.04	0.13	-0.17	0.26	0.10
2050	0.07	0.15	-0.18	0.32	0.14
2060	0.09	0.20	-0.23	0.41	0.21
2070	0.10	0.22	-0.26	0.47	0.26
2080	0.13	0.26	-0.30	0.55	0.34
2090	0.16	0.29	-0.31	0.64	0.43
2099	0.15	0.32	-0.38	0.69	0.48

Table 42b: Sea-level projections and sea-level allowances for RCP8.5 and for Saint-Joseph-de-la-Rive, Québec.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.02	0.05	-0.06	0.09	0.02
2020	0.02	0.08	-0.10	0.15	0.04
2030	0.03	0.10	-0.14	0.20	0.06
2040	0.04	0.15	-0.21	0.29	0.11
2050	0.09	0.17	-0.19	0.36	0.18
2060	0.15	0.21	-0.19	0.49	0.28
2070	0.19	0.23	-0.19	0.57	0.36
2080	0.24	0.28	-0.22	0.70	0.49
2090	0.31	0.31	-0.20	0.83	0.62
2099	0.37	0.35	-0.22	0.95	0.77

Table 43a: Sea-level projections and sea-level allowances for RCP4.5 and for Sept-Îles, Québec.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	-0.02	0.04	-0.09	0.04	-0.02
2020	-0.02	0.08	-0.15	0.12	0.01
2030	0.01	0.12	-0.18	0.20	0.06
2040	0.01	0.14	-0.21	0.23	0.08
2050	0.03	0.15	-0.22	0.29	0.12
2060	0.04	0.20	-0.29	0.37	0.19
2070	0.05	0.23	-0.32	0.42	0.24
2080	0.07	0.26	-0.36	0.50	0.33
2090	0.10	0.29	-0.39	0.58	0.42
2099	0.08	0.33	-0.46	0.62	0.49

Table 43b: Sea-level projections and sea-level allowances for RCP8.5 and for Sept-Îles, Québec.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.00	0.05	-0.07	0.08	0.01
2020	0.00	0.08	-0.12	0.13	0.03
2030	0.00	0.11	-0.17	0.18	0.05
2040	0.01	0.15	-0.24	0.26	0.10
2050	0.05	0.17	-0.23	0.33	0.16
2060	0.10	0.21	-0.24	0.45	0.27
2070	0.14	0.24	-0.25	0.53	0.35
2080	0.19	0.28	-0.28	0.65	0.49
2090	0.25	0.32	-0.28	0.77	0.62
2099	0.30	0.36	-0.30	0.89	0.78

Table 44a: Sea-level projections and sea-level allowances for RCP4.5 and for Shediac Bay, New Brunswick.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.04	0.04	-0.02	0.11	0.05
2020	0.08	0.07	-0.03	0.19	0.09
2030	0.13	0.10	-0.03	0.29	0.15
2040	0.20	0.12	0.01	0.39	0.23
2050	0.25	0.13	0.02	0.47	0.29
2060	0.29	0.17	0.01	0.57	0.36
2070	0.34	0.19	0.03	0.66	0.42
2080	0.40	0.22	0.03	0.76	0.51
2090	0.45	0.26	0.03	0.87	0.60
2099	0.48	0.28	0.02	0.93	0.65

Table 44b: Sea-level projections and sea-level allowances for RCP8.5 and for Shediac Bay, New Brunswick.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.07	0.04	0.00	0.14	0.07
2020	0.10	0.07	-0.02	0.21	0.11
2030	0.15	0.10	0.00	0.31	0.17
2040	0.20	0.12	0.00	0.40	0.23
2050	0.28	0.15	0.03	0.53	0.33
2060	0.36	0.18	0.07	0.65	0.43
2070	0.43	0.21	0.08	0.77	0.53
2080	0.52	0.25	0.11	0.92	0.65
2090	0.62	0.28	0.17	1.08	0.80
2099	0.69	0.31	0.18	1.20	0.90

Table 45a: Sea-level projections and sea-level allowances for RCP4.5 and for St John's, Newfoundland.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.07	0.02	0.03	0.11	0.07
2020	0.11	0.04	0.05	0.17	0.12
2030	0.17	0.05	0.09	0.26	0.19
2040	0.24	0.07	0.13	0.35	0.26
2050	0.30	0.08	0.17	0.43	0.34
2060	0.37	0.10	0.21	0.52	0.42
2070	0.44	0.12	0.24	0.63	0.53
2080	0.50	0.14	0.27	0.73	0.62
2090	0.55	0.17	0.28	0.83	0.73
2099	0.59	0.18	0.30	0.89	0.79

Table 45b: Sea-level projections and sea-level allowances for RCP8.5 and for St John's, Newfoundland.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.07	0.03	0.03	0.11	0.07
2020	0.12	0.04	0.06	0.18	0.13
2030	0.19	0.05	0.11	0.27	0.21
2040	0.25	0.06	0.15	0.35	0.27
2050	0.33	0.08	0.19	0.47	0.38
2060	0.42	0.10	0.25	0.59	0.49
2070	0.50	0.14	0.27	0.73	0.62
2080	0.62	0.16	0.35	0.88	0.78
2090	0.72	0.19	0.41	1.03	0.94
2099	0.81	0.22	0.44	1.17	1.11

Table 46a: Sea-level projections and sea-level allowances for RCP4.5 and for Yarmouth, Nova Scotia.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.05	0.03	0.00	0.09	0.05
2020	0.09	0.05	0.00	0.17	0.10
2030	0.13	0.07	0.01	0.25	0.16
2040	0.20	0.08	0.07	0.32	0.23
2050	0.24	0.09	0.10	0.38	0.28
2060	0.29	0.12	0.10	0.49	0.36
2070	0.35	0.13	0.13	0.57	0.44
2080	0.41	0.16	0.15	0.67	0.53
2090	0.46	0.19	0.16	0.77	0.63
2099	0.48	0.20	0.15	0.81	0.68

Table 46b: Sea-level projections and sea-level allowances for RCP8.5 and for Yarmouth, Nova Scotia.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.06	0.03	0.01	0.12	0.07
2020	0.10	0.05	0.01	0.18	0.11
2030	0.16	0.06	0.06	0.26	0.18
2040	0.21	0.08	0.07	0.35	0.24
2050	0.28	0.11	0.10	0.45	0.33
2060	0.36	0.12	0.16	0.57	0.44
2070	0.43	0.15	0.18	0.68	0.54
2080	0.53	0.18	0.24	0.82	0.69
2090	0.63	0.21	0.29	0.97	0.84
2099	0.71	0.24	0.31	1.11	1.01

APPENDIX B3: Summary of sea level allowances for tide gauges along the coast of Washington, United States.

Table 47a: Sea-level projections and sea-level allowances for RCP4.5 and for Cherry Point, Washington, USA.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.01	0.02	-0.03	0.05	0.01
2020	0.03	0.03	-0.01	0.08	0.03
2030	0.06	0.04	0.00	0.12	0.06
2040	0.08	0.05	0.00	0.16	0.09
2050	0.12	0.05	0.05	0.20	0.13
2060	0.14	0.06	0.04	0.25	0.16
2070	0.18	0.07	0.06	0.30	0.20
2080	0.21	0.09	0.07	0.36	0.24
2090	0.27	0.10	0.10	0.43	0.30
2099	0.30	0.12	0.10	0.51	0.36

Table 47b: Sea-level projections and sea-level allowances for RCP8.5 and for Cherry Point, Washington, USA.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.01	0.03	-0.04	0.06	0.01
2020	0.03	0.03	-0.02	0.09	0.04
2030	0.06	0.04	0.00	0.11	0.06
2040	0.08	0.04	0.01	0.15	0.09
2050	0.13	0.05	0.04	0.21	0.13
2060	0.16	0.07	0.05	0.27	0.18
2070	0.22	0.08	0.08	0.36	0.24
2080	0.28	0.10	0.12	0.44	0.31
2090	0.35	0.12	0.15	0.54	0.40
2099	0.41	0.15	0.17	0.66	0.49

Table 48a: Sea-level projections and sea-level allowances for RCP4.5 and for Friday Harbor, Washington, USA.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.01	0.02	-0.03	0.05	0.02
2020	0.04	0.03	-0.01	0.08	0.04
2030	0.07	0.04	0.00	0.13	0.07
2040	0.09	0.05	0.01	0.18	0.10
2050	0.14	0.05	0.06	0.22	0.15
2060	0.16	0.06	0.06	0.27	0.18
2070	0.20	0.08	0.08	0.33	0.22
2080	0.24	0.09	0.09	0.39	0.27
2090	0.29	0.11	0.12	0.47	0.33
2099	0.33	0.13	0.12	0.55	0.40

Table 48b: Sea-level projections and sea-level allowances for RCP8.5 and for Friday Harbor, Washington, USA.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.01	0.03	-0.04	0.06	0.02
2020	0.04	0.03	-0.02	0.09	0.04
2030	0.07	0.04	0.00	0.13	0.07
2040	0.09	0.04	0.02	0.16	0.10
2050	0.14	0.05	0.05	0.23	0.15
2060	0.18	0.07	0.07	0.29	0.20
2070	0.24	0.09	0.10	0.38	0.27
2080	0.30	0.10	0.13	0.47	0.34
2090	0.38	0.12	0.18	0.57	0.43
2099	0.44	0.15	0.20	0.69	0.53

Table 49a: Sea-level projections and sea-level allowances for RCP4.5 and for Neah Bay, Washington, USA.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.02	0.02	-0.02	0.06	0.03
2020	0.05	0.03	0.00	0.10	0.05
2030	0.09	0.04	0.02	0.15	0.09
2040	0.12	0.05	0.04	0.21	0.13
2050	0.17	0.05	0.08	0.25	0.18
2060	0.20	0.07	0.08	0.32	0.22
2070	0.24	0.08	0.11	0.38	0.27
2080	0.29	0.10	0.12	0.46	0.33
2090	0.35	0.12	0.16	0.54	0.40
2099	0.39	0.14	0.17	0.62	0.47

Table 49b: Sea-level projections and sea-level allowances for RCP8.5 and for Neah Bay, Washington, USA.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.02	0.03	-0.03	0.07	0.02
2020	0.05	0.03	0.00	0.11	0.06
2030	0.09	0.04	0.02	0.16	0.09
2040	0.12	0.05	0.04	0.20	0.13
2050	0.17	0.06	0.08	0.27	0.19
2060	0.22	0.08	0.09	0.36	0.25
2070	0.29	0.10	0.13	0.45	0.32
2080	0.36	0.12	0.16	0.55	0.41
2090	0.44	0.14	0.21	0.67	0.51
2099	0.51	0.17	0.23	0.79	0.62

Table 50a: Sea-level projections and sea-level allowances for RCP4.5 and for Port Angeles, Washington, USA.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.02	0.03	-0.02	0.06	0.02
2020	0.05	0.03	0.00	0.09	0.05
2030	0.08	0.04	0.01	0.15	0.09
2040	0.11	0.05	0.03	0.20	0.12
2050	0.16	0.05	0.07	0.24	0.17
2060	0.19	0.07	0.08	0.30	0.20
2070	0.23	0.08	0.10	0.36	0.25
2080	0.27	0.10	0.11	0.43	0.30
2090	0.33	0.11	0.15	0.51	0.37
2099	0.37	0.13	0.15	0.59	0.44

Table 50b: Sea-level projections and sea-level allowances for RCP8.5 and for Port Angeles, Washington, USA.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.02	0.03	-0.03	0.07	0.02
2020	0.05	0.03	-0.01	0.11	0.05
2030	0.08	0.04	0.01	0.14	0.08
2040	0.11	0.05	0.03	0.18	0.12
2050	0.16	0.06	0.07	0.25	0.17
2060	0.21	0.07	0.09	0.32	0.22
2070	0.27	0.09	0.12	0.42	0.30
2080	0.33	0.11	0.16	0.51	0.38
2090	0.41	0.13	0.20	0.62	0.47
2099	0.48	0.16	0.23	0.74	0.57

Table 51a: Sea-level projections and sea-level allowances for RCP4.5 and for Port Townsend, Washington, USA.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.02	0.03	-0.02	0.06	0.02
2020	0.04	0.03	0.00	0.09	0.05
2030	0.08	0.04	0.01	0.14	0.08
2040	0.11	0.05	0.02	0.19	0.12
2050	0.15	0.05	0.07	0.23	0.16
2060	0.18	0.07	0.07	0.29	0.20
2070	0.22	0.08	0.09	0.35	0.24
2080	0.26	0.09	0.11	0.42	0.29
2090	0.32	0.11	0.14	0.50	0.36
2099	0.36	0.13	0.15	0.58	0.42

Table 51b: Sea-level projections and sea-level allowances for RCP8.5 and for Port Townsend, Washington, USA.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.02	0.03	-0.03	0.07	0.02
2020	0.05	0.03	-0.01	0.10	0.05
2030	0.07	0.04	0.01	0.14	0.08
2040	0.10	0.05	0.03	0.18	0.11
2050	0.16	0.06	0.07	0.25	0.17
2060	0.20	0.07	0.08	0.32	0.22
2070	0.26	0.09	0.12	0.41	0.29
2080	0.33	0.11	0.15	0.50	0.37
2090	0.40	0.13	0.20	0.61	0.46
2099	0.47	0.16	0.22	0.73	0.56

Table 52a: Sea-level projections and sea-level allowances for RCP4.5 and for Toke Point, Washington, USA.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.03	0.03	-0.01	0.08	0.04
2020	0.07	0.03	0.02	0.11	0.07
2030	0.11	0.04	0.04	0.18	0.12
2040	0.15	0.05	0.07	0.24	0.16
2050	0.21	0.05	0.12	0.29	0.21
2060	0.25	0.07	0.13	0.36	0.26
2070	0.30	0.08	0.16	0.44	0.32
2080	0.35	0.10	0.18	0.52	0.38
2090	0.42	0.12	0.22	0.61	0.45
2099	0.47	0.14	0.24	0.70	0.52

Table 52b: Sea-level projections and sea-level allowances for RCP8.5 and for Toke Point, Washington, USA.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.03	0.03	-0.02	0.09	0.04
2020	0.07	0.03	0.02	0.13	0.07
2030	0.11	0.04	0.04	0.18	0.12
2040	0.15	0.05	0.07	0.23	0.16
2050	0.21	0.06	0.12	0.31	0.22
2060	0.27	0.08	0.14	0.40	0.29
2070	0.34	0.10	0.18	0.50	0.37
2080	0.42	0.12	0.22	0.61	0.45
2090	0.51	0.14	0.27	0.74	0.56
2099	0.59	0.17	0.31	0.87	0.67

APPENDIX B4: Summary of sea level allowances for tide gauges along the coast of Alaska, United States.

Table 53a: Sea-level projections and sea-level allowances for RCP4.5 and for Cordova, Alaska, USA.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.01	0.03	-0.04	0.06	0.02
2020	0.04	0.03	-0.02	0.09	0.04
2030	0.05	0.04	-0.02	0.11	0.05
2040	0.08	0.06	-0.01	0.18	0.10
2050	0.13	0.07	0.02	0.24	0.15
2060	0.16	0.09	0.00	0.31	0.19
2070	0.19	0.10	0.03	0.35	0.23
2080	0.23	0.12	0.03	0.43	0.29
2090	0.28	0.14	0.04	0.51	0.36
2099	0.29	0.16	0.03	0.55	0.40

Table 53b: Sea-level projections and sea-level allowances for RCP8.5 and for Cordova, Alaska, USA.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.01	0.03	-0.03	0.06	0.02
2020	0.03	0.05	-0.04	0.11	0.04
2030	0.05	0.05	-0.03	0.13	0.06
2040	0.09	0.05	0.00	0.18	0.10
2050	0.13	0.07	0.01	0.25	0.15
2060	0.17	0.10	0.02	0.33	0.21
2070	0.23	0.13	0.02	0.44	0.30
2080	0.28	0.14	0.05	0.51	0.36
2090	0.37	0.17	0.09	0.65	0.49
2099	0.42	0.20	0.09	0.75	0.59

Table 54a: Sea-level projections and sea-level allowances for RCP4.5 and for Ketchikan, Alaska, USA.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.01	0.03	-0.04	0.05	0.01
2020	0.02	0.03	-0.02	0.06	0.02
2030	0.03	0.04	-0.03	0.10	0.04
2040	0.06	0.05	-0.02	0.15	0.07
2050	0.10	0.06	0.01	0.20	0.11
2060	0.12	0.08	-0.01	0.25	0.14
2070	0.16	0.09	0.00	0.31	0.19
2080	0.19	0.11	0.01	0.37	0.23
2090	0.23	0.13	0.01	0.45	0.29
2099	0.26	0.15	0.01	0.50	0.33

Table 54b: Sea-level projections and sea-level allowances for RCP8.5 and for Ketchikan, Alaska, USA.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.00	0.03	-0.04	0.05	0.01
2020	0.03	0.04	-0.04	0.10	0.03
2030	0.03	0.05	-0.05	0.12	0.04
2040	0.07	0.05	-0.02	0.16	0.08
2050	0.10	0.07	-0.01	0.21	0.12
2060	0.15	0.09	0.01	0.29	0.17
2070	0.19	0.11	0.01	0.38	0.24
2080	0.24	0.13	0.03	0.45	0.30
2090	0.32	0.16	0.07	0.58	0.41
2099	0.38	0.19	0.07	0.68	0.50

Table 55a: Sea-level projections and sea-level allowances for RCP4.5 and for Kodiak, Alaska, USA.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.03	0.04	-0.03	0.10	0.04
2020	0.06	0.04	0.00	0.12	0.07
2030	0.09	0.06	0.00	0.19	0.11
2040	0.12	0.07	0.00	0.24	0.15
2050	0.18	0.07	0.06	0.31	0.21
2060	0.25	0.10	0.08	0.41	0.29
2070	0.28	0.10	0.11	0.45	0.33
2080	0.33	0.12	0.13	0.53	0.39
2090	0.38	0.15	0.13	0.63	0.49
2099	0.44	0.17	0.17	0.71	0.56

Table 55b: Sea-level projections and sea-level allowances for RCP8.5 and for Kodiak, Alaska, USA.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.04	0.03	-0.02	0.09	0.04
2020	0.06	0.05	-0.02	0.14	0.07
2030	0.10	0.05	0.01	0.19	0.11
2040	0.14	0.06	0.04	0.24	0.16
2050	0.20	0.08	0.07	0.33	0.23
2060	0.28	0.10	0.12	0.44	0.33
2070	0.33	0.13	0.12	0.54	0.41
2080	0.42	0.15	0.18	0.66	0.52
2090	0.51	0.18	0.21	0.81	0.66
2099	0.59	0.21	0.25	0.94	0.79

Table 56a: Sea-level projections and sea-level allowances for RCP4.5 and for Prudhoe Bay, Alaska, USA.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.03	0.03	-0.02	0.09	0.03
2020	0.09	0.04	0.02	0.15	0.09
2030	0.13	0.05	0.05	0.22	0.14
2040	0.19	0.07	0.08	0.29	0.20
2050	0.24	0.08	0.10	0.37	0.25
2060	0.28	0.11	0.10	0.46	0.31
2070	0.35	0.13	0.13	0.57	0.40
2080	0.40	0.17	0.12	0.69	0.48
2090	0.44	0.19	0.13	0.75	0.53
2099	0.51	0.21	0.16	0.85	0.62

Table 56b: Sea-level projections and sea-level allowances for RCP8.5 and for Prudhoe Bay, Alaska, USA.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.03	0.04	-0.03	0.10	0.04
2020	0.08	0.04	0.01	0.15	0.08
2030	0.13	0.06	0.03	0.24	0.14
2040	0.22	0.06	0.12	0.32	0.23
2050	0.27	0.08	0.14	0.41	0.29
2060	0.32	0.12	0.13	0.52	0.36
2070	0.43	0.16	0.17	0.69	0.50
2080	0.52	0.20	0.18	0.85	0.63
2090	0.61	0.24	0.22	1.00	0.76
2099	0.70	0.28	0.24	1.17	0.92

Table 57a: Sea-level projections and sea-level allowances for RCP4.5 and for Seldovia, Alaska, USA.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.01	0.04	-0.05	0.07	0.01
2020	0.04	0.03	-0.01	0.09	0.04
2030	0.07	0.04	0.01	0.14	0.08
2040	0.12	0.05	0.04	0.20	0.13
2050	0.16	0.07	0.05	0.28	0.18
2060	0.21	0.10	0.05	0.37	0.24
2070	0.24	0.10	0.07	0.41	0.27
2080	0.29	0.13	0.08	0.50	0.34
2090	0.34	0.15	0.10	0.59	0.42
2099	0.36	0.17	0.08	0.64	0.46

Table 57b: Sea-level projections and sea-level allowances for RCP8.5 and for Seldovia, Alaska, USA.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.02	0.03	-0.02	0.06	0.02
2020	0.07	0.04	0.01	0.13	0.07
2030	0.06	0.05	-0.03	0.15	0.07
2040	0.12	0.06	0.02	0.22	0.13
2050	0.17	0.08	0.04	0.29	0.19
2060	0.24	0.10	0.08	0.41	0.28
2070	0.29	0.14	0.06	0.52	0.36
2080	0.35	0.15	0.10	0.60	0.43
2090	0.46	0.19	0.15	0.76	0.58
2099	0.51	0.22	0.14	0.87	0.68

Table 58a: Sea-level projections and sea-level allowances for RCP4.5 and for Seward, Alaska, USA.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.02	0.04	-0.04	0.08	0.02
2020	0.05	0.03	-0.01	0.10	0.05
2030	0.07	0.04	-0.01	0.14	0.07
2040	0.10	0.06	0.00	0.20	0.12
2050	0.15	0.07	0.04	0.26	0.17
2060	0.20	0.09	0.04	0.35	0.23
2070	0.23	0.10	0.07	0.39	0.27
2080	0.27	0.11	0.09	0.46	0.33
2090	0.32	0.14	0.09	0.56	0.41
2099	0.36	0.16	0.10	0.61	0.47

Table 58b: Sea-level projections and sea-level allowances for RCP8.5 and for Seward, Alaska, USA.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.02	0.03	-0.03	0.07	0.02
2020	0.05	0.05	-0.03	0.13	0.06
2030	0.07	0.05	-0.01	0.15	0.08
2040	0.11	0.05	0.02	0.20	0.13
2050	0.16	0.07	0.04	0.28	0.18
2060	0.23	0.09	0.08	0.38	0.27
2070	0.27	0.12	0.07	0.47	0.34
2080	0.34	0.14	0.12	0.56	0.42
2090	0.42	0.16	0.15	0.69	0.55
2099	0.49	0.19	0.17	0.81	0.66

Table 59a: Sea-level projections and sea-level allowances for RCP4.5 and for Sitka, Alaska, USA.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.02	0.02	-0.02	0.06	0.02
2020	0.05	0.03	0.00	0.09	0.05
2030	0.07	0.03	0.01	0.13	0.07
2040	0.10	0.05	0.02	0.18	0.11
2050	0.15	0.05	0.07	0.24	0.16
2060	0.19	0.07	0.06	0.31	0.21
2070	0.22	0.08	0.09	0.36	0.25
2080	0.27	0.10	0.10	0.44	0.32
2090	0.31	0.12	0.11	0.51	0.38
2099	0.35	0.14	0.12	0.57	0.43

Table 59b: Sea-level projections and sea-level allowances for RCP8.5 and for Sitka, Alaska, USA.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.02	0.03	-0.02	0.07	0.02
2020	0.05	0.04	-0.01	0.11	0.05
2030	0.07	0.05	-0.01	0.14	0.08
2040	0.11	0.05	0.03	0.18	0.12
2050	0.15	0.06	0.05	0.25	0.17
2060	0.21	0.08	0.08	0.34	0.24
2070	0.26	0.11	0.09	0.44	0.31
2080	0.32	0.12	0.13	0.52	0.39
2090	0.41	0.14	0.17	0.65	0.50
2099	0.47	0.18	0.18	0.76	0.61

Table 60a: Sea-level projections and sea-level allowances for RCP4.5 and for Valdez, Alaska, USA.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.02	0.03	-0.04	0.07	0.02
2020	0.04	0.03	-0.02	0.09	0.04
2030	0.05	0.04	-0.02	0.12	0.06
2040	0.09	0.06	-0.01	0.18	0.10
2050	0.13	0.07	0.02	0.24	0.15
2060	0.16	0.09	0.01	0.31	0.20
2070	0.19	0.10	0.03	0.35	0.23
2080	0.23	0.12	0.03	0.43	0.29
2090	0.28	0.14	0.04	0.51	0.36
2099	0.29	0.16	0.03	0.56	0.40

Table 60b: Sea-level projections and sea-level allowances for RCP8.5 and for Valdez, Alaska, USA.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.02	0.03	-0.03	0.06	0.02
2020	0.04	0.05	-0.04	0.12	0.05
2030	0.05	0.05	-0.04	0.14	0.06
2040	0.09	0.06	0.00	0.18	0.10
2050	0.13	0.07	0.01	0.25	0.16
2060	0.18	0.10	0.02	0.34	0.22
2070	0.23	0.13	0.02	0.44	0.30
2080	0.28	0.14	0.05	0.51	0.36
2090	0.37	0.17	0.09	0.65	0.49
2099	0.41	0.20	0.08	0.75	0.59

Table 61a: Sea-level projections and sea-level allowances for RCP4.5 and for Yakutat, Alaska, USA.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.01	0.03	-0.04	0.06	0.01
2020	0.03	0.03	-0.02	0.08	0.03
2030	0.04	0.04	-0.03	0.11	0.05
2040	0.08	0.06	-0.02	0.17	0.09
2050	0.12	0.07	0.01	0.24	0.14
2060	0.14	0.10	-0.01	0.30	0.18
2070	0.17	0.10	0.01	0.33	0.21
2080	0.21	0.12	0.01	0.42	0.27
2090	0.26	0.15	0.02	0.50	0.33
2099	0.27	0.16	0.01	0.54	0.37

Table 61b: Sea-level projections and sea-level allowances for RCP8.5 and for Yakutat, Alaska, USA.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.01	0.03	-0.04	0.05	0.01
2020	0.03	0.05	-0.05	0.11	0.04
2030	0.05	0.06	-0.05	0.14	0.06
2040	0.08	0.06	-0.02	0.18	0.09
2050	0.12	0.08	0.00	0.24	0.14
2060	0.16	0.10	0.00	0.33	0.20
2070	0.21	0.13	-0.01	0.42	0.27
2080	0.26	0.14	0.02	0.49	0.33
2090	0.34	0.18	0.06	0.63	0.46
2099	0.39	0.21	0.05	0.73	0.55

APPENDIX B5: Summary of sea level allowances for tide gauges along the east coast of the United States.

Table 62a: Sea-level projections and sea-level allowances for RCP4.5 and for Boston, Massachusetts, USA.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.04	0.04	-0.01	0.10	0.05
2020	0.07	0.06	-0.03	0.17	0.09
2030	0.12	0.09	-0.03	0.27	0.15
2040	0.20	0.10	0.04	0.37	0.24
2050	0.25	0.11	0.07	0.43	0.30
2060	0.28	0.14	0.05	0.52	0.36
2070	0.35	0.16	0.09	0.61	0.44
2080	0.43	0.19	0.11	0.74	0.56
2090	0.48	0.23	0.10	0.85	0.66
2099	0.51	0.24	0.11	0.91	0.73

Table 62b: Sea-level projections and sea-level allowances for RCP8.5 and for Boston, Massachusetts, USA.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.06	0.04	-0.01	0.13	0.07
2020	0.08	0.06	-0.01	0.18	0.10
2030	0.16	0.08	0.03	0.29	0.18
2040	0.20	0.10	0.04	0.37	0.24
2050	0.27	0.12	0.06	0.47	0.32
2060	0.36	0.16	0.10	0.62	0.45
2070	0.43	0.19	0.13	0.74	0.56
2080	0.54	0.22	0.18	0.90	0.71
2090	0.65	0.25	0.24	1.05	0.87
2099	0.73	0.29	0.25	1.22	1.05

Table 63a: Sea-level projections and sea-level allowances for RCP4.5 and for Eastport, Maine, USA.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.03	0.03	-0.02	0.09	0.04
2020	0.07	0.06	-0.03	0.17	0.09
2030	0.10	0.08	-0.03	0.24	0.15
2040	0.16	0.09	0.02	0.30	0.20
2050	0.19	0.10	0.03	0.36	0.25
2060	0.24	0.13	0.02	0.45	0.34
2070	0.28	0.15	0.03	0.53	0.42
2080	0.33	0.18	0.04	0.63	0.53
2090	0.38	0.21	0.03	0.73	0.65
2099	0.40	0.23	0.02	0.77	0.72

Table 63b: Sea-level projections and sea-level allowances for RCP8.5 and for Eastport, Maine, USA.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.05	0.04	-0.02	0.11	0.06
2020	0.07	0.06	-0.02	0.17	0.10
2030	0.13	0.07	0.01	0.25	0.16
2040	0.16	0.09	0.01	0.31	0.21
2050	0.23	0.12	0.03	0.42	0.31
2060	0.30	0.14	0.07	0.53	0.42
2070	0.36	0.17	0.08	0.64	0.53
2080	0.46	0.20	0.13	0.78	0.70
2090	0.55	0.23	0.17	0.93	0.87
2099	0.62	0.27	0.18	1.07	1.07

Table 64a: Sea-level projections and sea-level allowances for RCP4.5 and for Portland, Maine, USA.

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.03	0.04	-0.03	0.09	0.04
2020	0.06	0.06	-0.05	0.16	0.08
2030	0.10	0.09	-0.05	0.25	0.14
2040	0.16	0.10	-0.01	0.32	0.20
2050	0.20	0.11	0.01	0.38	0.25
2060	0.23	0.14	0.00	0.47	0.33
2070	0.28	0.16	0.01	0.55	0.40
2080	0.34	0.20	0.02	0.66	0.52
2090	0.39	0.23	0.01	0.76	0.62
2099	0.41	0.24	0.01	0.81	0.69

Table 64b: Sea-level projections and sea-level allowances for RCP8.5 and for Portland, Maine, USA.

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard deviation	5% percentile	95% percentile	
2010	0.05	0.04	-0.02	0.11	0.05
2020	0.06	0.06	-0.03	0.16	0.08
2030	0.12	0.08	-0.01	0.25	0.15
2040	0.16	0.10	-0.01	0.33	0.21
2050	0.22	0.13	0.01	0.43	0.29
2060	0.30	0.15	0.05	0.56	0.41
2070	0.37	0.18	0.07	0.67	0.53
2080	0.46	0.22	0.10	0.81	0.68
2090	0.55	0.24	0.15	0.95	0.83
2099	0.63	0.29	0.15	1.11	1.03